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1-1 Introduction

This manual contains service information pertaining to the CARDIOLIFE model TEC-7000 series defibrillator. Information concerning optional units such as transmitters, receivers, interface units, and pacing units is not included. See pages 1.10 to 1.12 for the models of TEC-7000 series. The operation and performance of all these models are the same unless otherwise specified. Also refer to the operator's manual to become familiarized with the equipment.

The CARDIOLIFE TEC-7000 series is a lightweight, compact system with an integrated recorder, dual-trace 5.5-inch CRT, AC power unit and battery charger. The TEC-7000 series is designed for simple operation during a cardiac emergency with only two steps required before energy discharge and a one-step energy level adjustment.

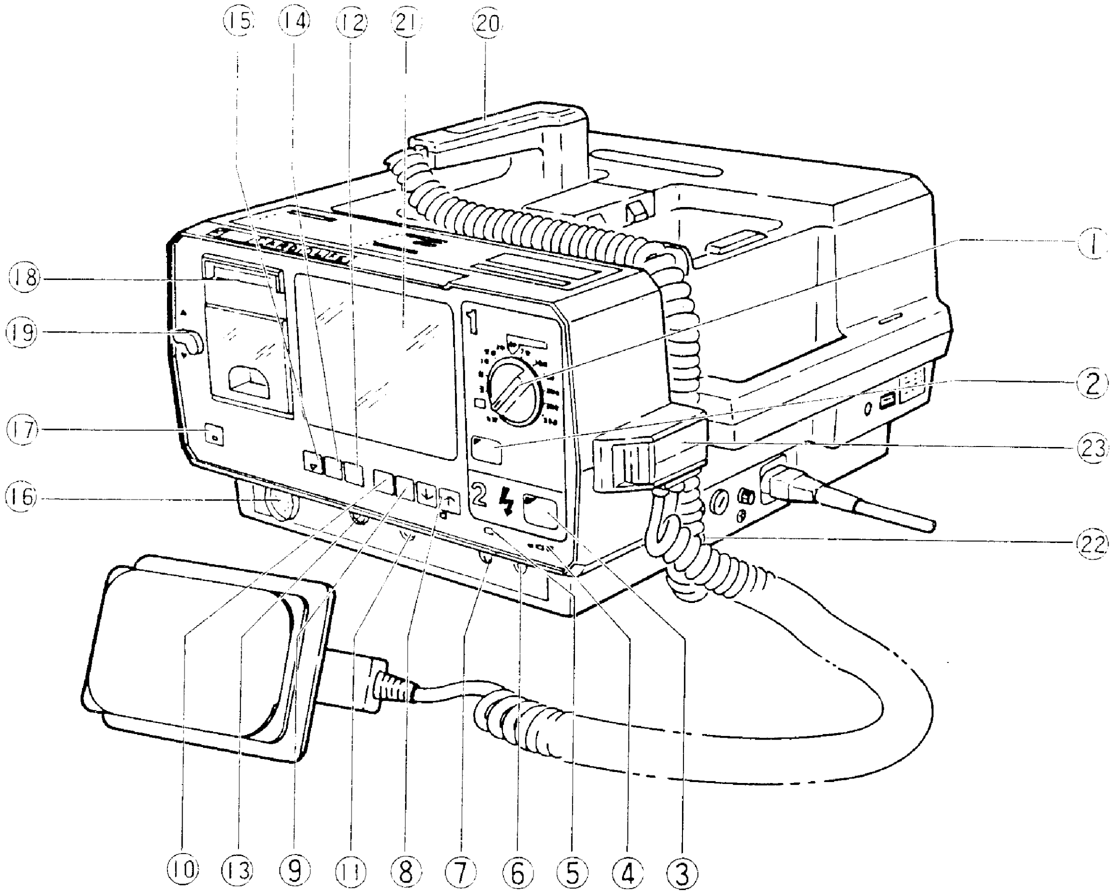
Special care must be taken for the power unit and high voltage board/block as these units have a dangerously high voltage level.

Difference among TEC-7000 series

Function	TEC-7100	TEC-7200	TEC-7300
Internal paddle	No	Yes	Yes
Paddle contact indicator	No	Yes	Yes
Delivered energy printing	No	Yes	Yes
Transthoracic resistance printing	No	Yes	Yes
Interface unit connection	No	No	Yes
Pacing unit connection	No	No	Yes
Slow paper speed (5mm/s)	No	No	Yes
VPC detection	No	No	Yes
Trendgraph	No	No	Yes

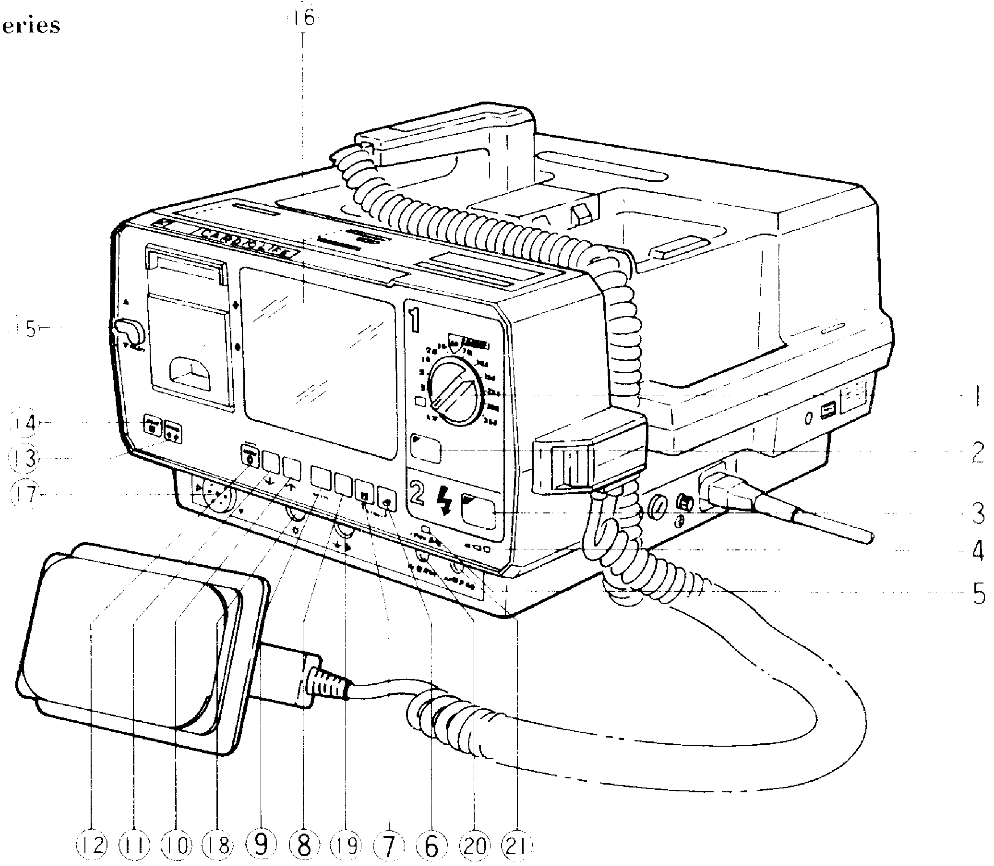
1-2 Name of Panels, Controls, etc

TEC-7100/7200 series



1 Output energy select dial
2 Synchronization mode select key
3 Energy charge key
4 Battery level indicator
5 Battery charge indicator
6 ECG output terminal
7 External ECG input terminal
8 High / low select key / calibration key
9 High / low limit set
10 Alarm ON / OFF key
11 QRS sound volume control knob
12 Sensitivity select key
13 Intensity control knob
14 Lead select key
15 Freeze key
16 ECG input connector
17 Record / stop key
18 Recorder
19 Head release / paper feed lever
20 Paddle
21 Monitor
22 AC power switch
23 Paddle connector (TEC -7200 only)

TEC-7300 series



1 Output energy selection dial

2 Synchronization mode select key

3 Energy charge key

4 Battery level indicator

5 Battery charge indicator

6 Display mode select key

7 Calibration key

8 Alarm on/off select key

9 Alarm set key

10 Sensitivity select key
Increase key

11 Lead select key
Decrease key
RECALL wave select key

12 Freeze key

13 Record select key

14 Record/stop key

15 Head release/paper feed lever

16 Monitor

17 ECG input connector

18 Intensity control knob

19 QRS sound volume control knob

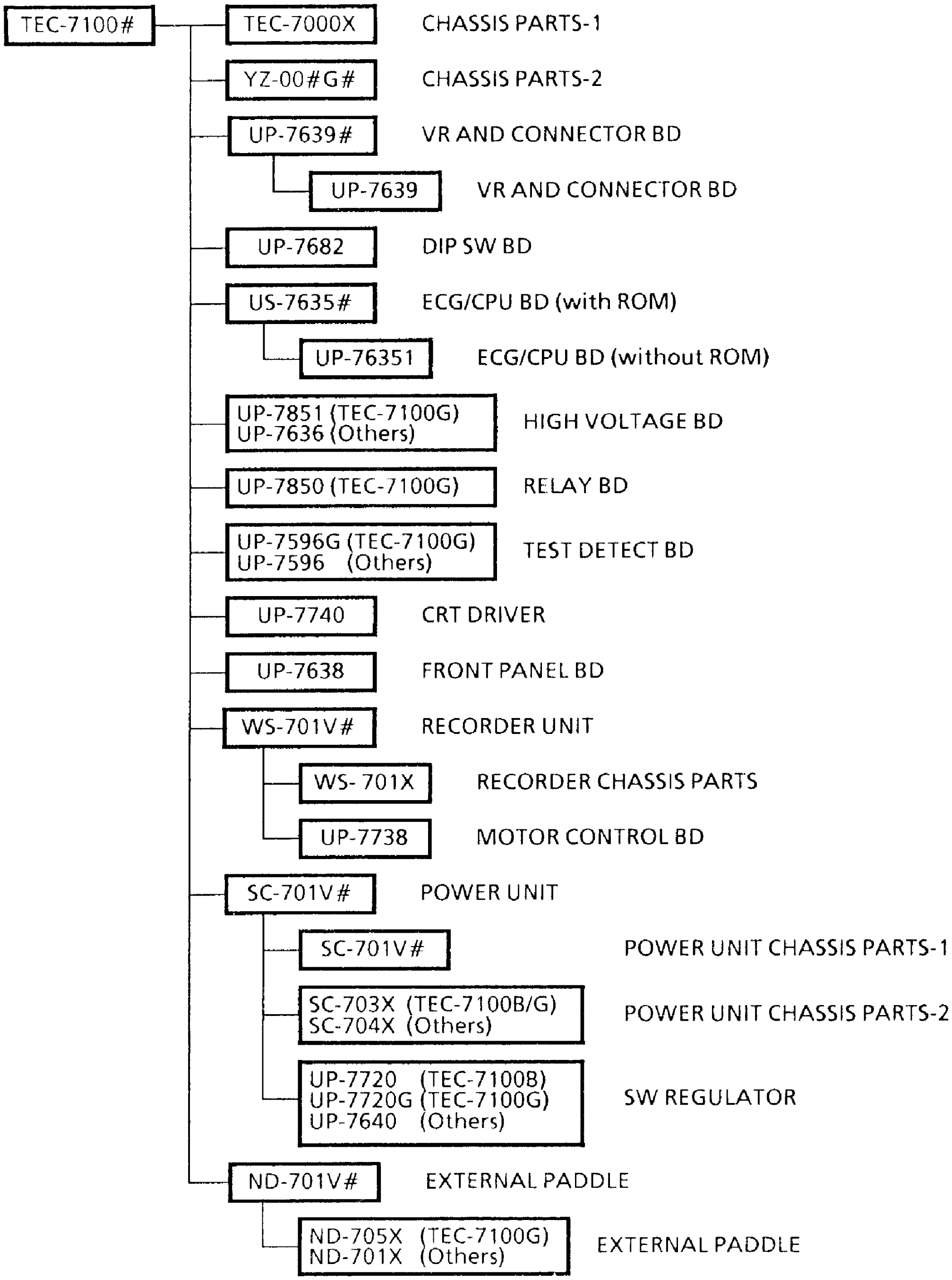
20 External input terminal

21 External output terminal

1-3 Composition

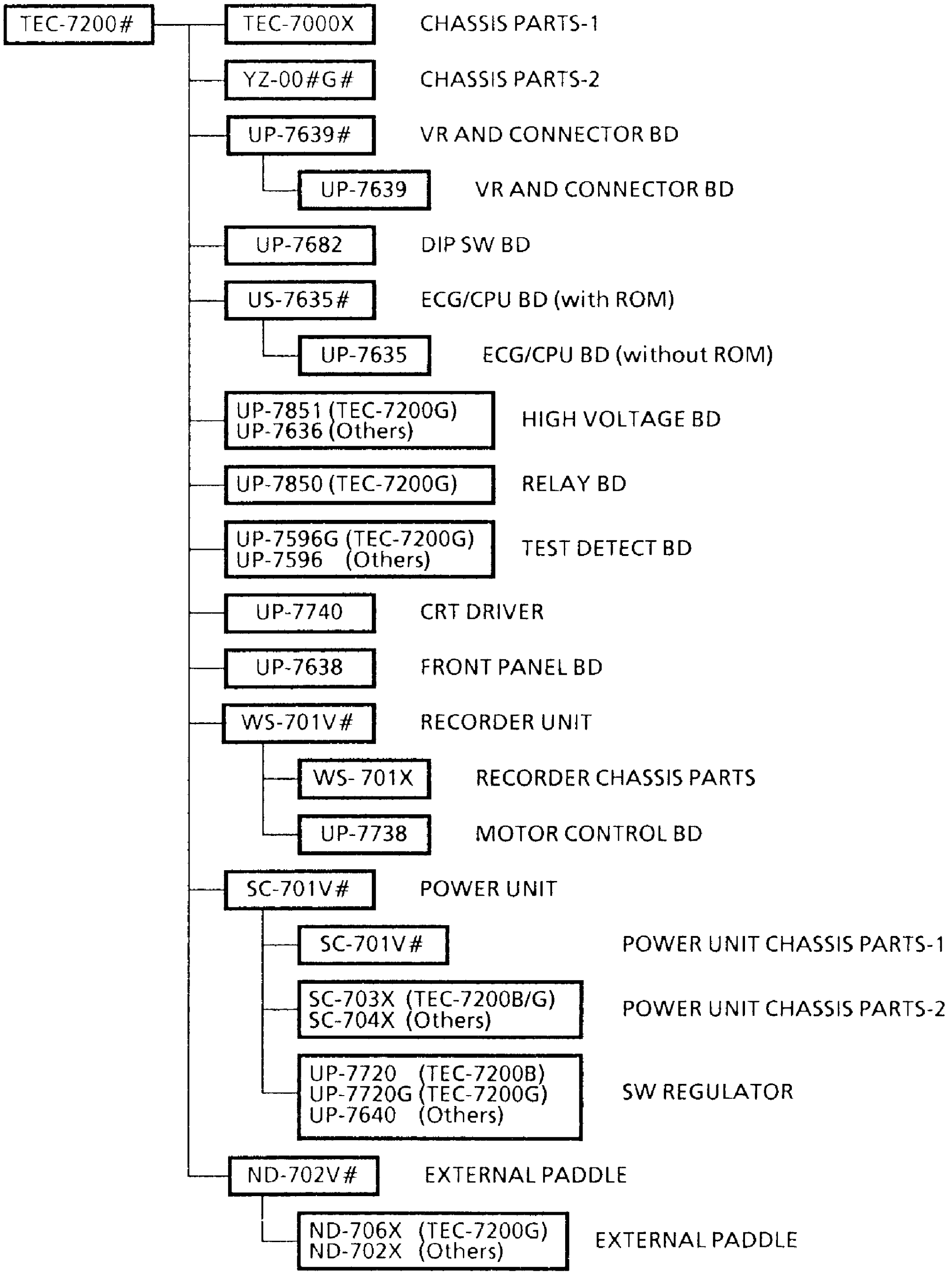
1-3-1 Main Unit

TEC-7100 series


TEC-7100#
TEC-7000X CHASSIS PARTS-1
YZ-00#G# CHASSIS PARTS-2
UP-7639# VR AND CONNECTOR BD
UP-7639 VR AND CONNECTOR BD
UP-7682 DIP SW BD
US-7635# ECG/CPU BD (with ROM)
UP-76351 ECG/CPU BD (without ROM)
UP-7851 (TEC-7100G)
UP-7636 (Others) HIGH VOLTAGE BD
UP-7850 (TEC-7100G) RELAY BD
UP-7596G (TEC-7100G)
UP-7596 (Others) TEST DETECT BD
UP-7740 CRT DRIVER
UP-7638 FRONT PANEL BD
WS-701V# RECORDER UNIT
WS- 701X RECORDER CHASSIS PARTS
UP-7738 MOTOR CONTROL BD
SC-701V# POWER UNIT
SC-701V# POWER UNIT CHASSIS PARTS-1
SC-703X (TEC-7100B/G)
SC-704X (Others) POWER UNIT CHASSIS PARTS-2
UP-7720 (TEC-7100B)
UP-7720G (TEC-7100G)
UP-7640 (Others) SW REGULATOR
ND-701V# EXTERNAL PADDLE
ND-705X (TEC-7100G)
ND-701X (Others) EXTERNAL PADDLE

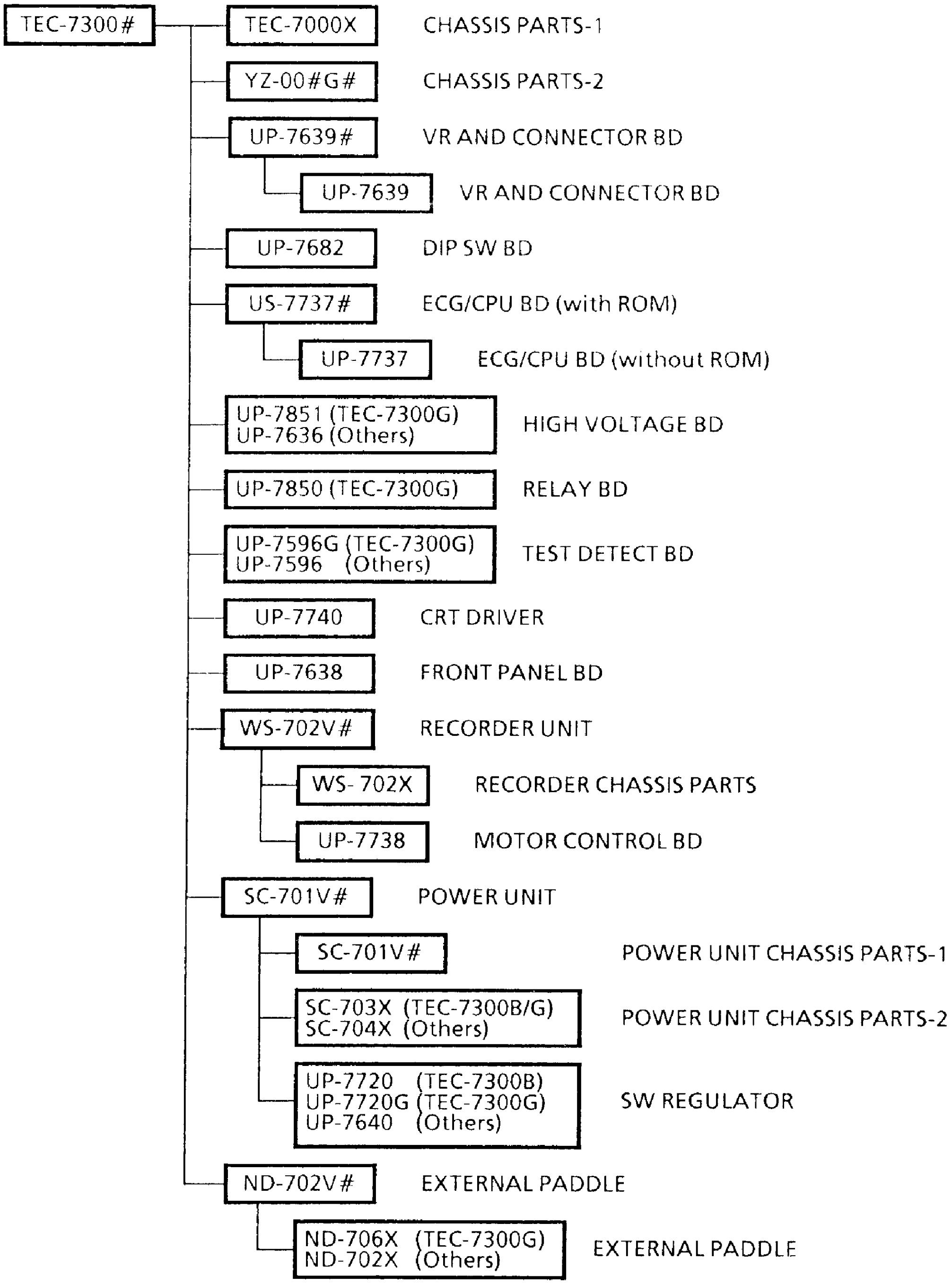
Units with # mark differ according to the model.
See page 1.10 for units with # mark.

TEC-7200 series


TEC-7200#
TEC-7000X
CHASSIS PARTS-1
YZ-00#G#
CHASSIS PARTS-2
UP-7639#
VR AND CONNECTOR BD
UP-7639
VR AND CONNECTOR BD
UP-7682
DIP SW BD
US-7635#
ECG/CPU BD (with ROM)
UP-7635
ECG/CPU BD (without ROM)
UP-7851 (TEC-7200G)
UP-7636 (Others)
HIGH VOLTAGE BD
UP-7850 (TEC-7200G)
RELAY BD
UP-7596G (TEC-7200G)
UP-7596 (Others)
TEST DETECT BD
UP-7740
CRT DRIVER
UP-7638
FRONT PANEL BD
WS-701V#
RECORDER UNIT
WS- 701X
RECORDER CHASSIS PARTS
UP-7738
MOTOR CONTROL BD
SC-701V#
POWER UNIT
SC-701V#
POWER UNIT CHASSIS PARTS-1
SC-703X (TEC-7200B/G)
SC-704X (Others)
POWER UNIT CHASSIS PARTS-2
UP-7720 (TEC-7200B)
UP-7720G (TEC-7200G)
UP-7640 (Others)
SW REGULATOR
ND-702V#
EXTERNAL PADDLE
ND-706X (TEC-7200G)
ND-702X (Others)
EXTERNAL PADDLE

Units with # mark differ according to the model.
See page 1.11 for units with # mark.

TEC-7300 series

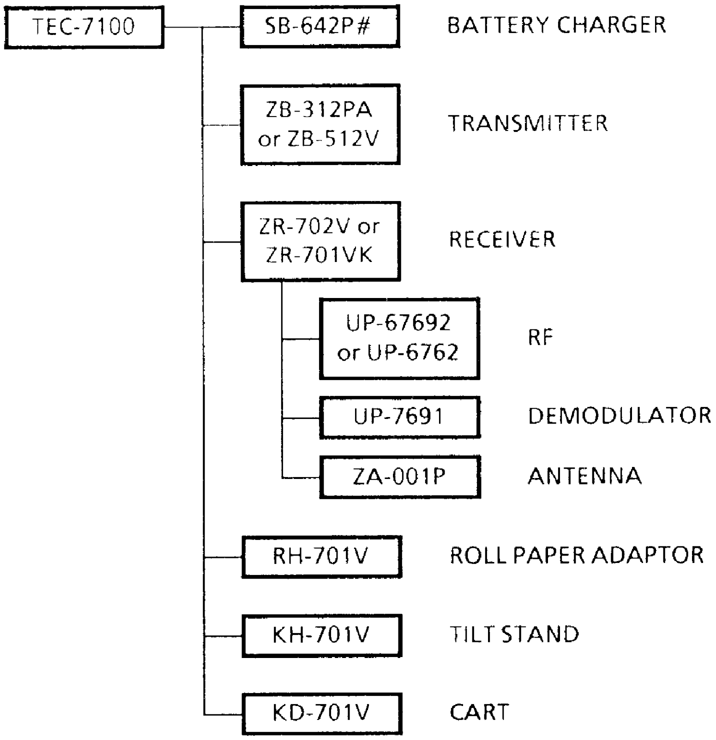


- TEC-7300#
  - TEC-7000X CHASSIS PARTS-1
  - YZ-00#G# CHASSIS PARTS-2
  - UP-7639# VR AND CONNECTOR BD
    - UP-7639 VR AND CONNECTOR BD
  - UP-7682 DIP SW BD
  - US-7737# ECG/CPU BD (with ROM)
    - UP-7737 ECG/CPU BD (without ROM)
  - UP-7851 (TEC-7300G)
UP-7636 (Others) HIGH VOLTAGE BD
  - UP-7850 (TEC-7300G) RELAY BD
  - UP-7596G (TEC-7300G)
UP-7596 (Others) TEST DETECT BD
  - UP-7740 CRT DRIVER
  - UP-7638 FRONT PANEL BD
  - WS-702V# RECORDER UNIT
    - WS- 702X RECORDER CHASSIS PARTS
    - UP-7738 MOTOR CONTROL BD
  - SC-701V# POWER UNIT
    - SC-701V# POWER UNIT CHASSIS PARTS-1
    - SC-703X (TEC-7300B/G)
SC-704X (Others) POWER UNIT CHASSIS PARTS-2
    - UP-7720 (TEC-7300B)
UP-7720G (TEC-7300G)
UP-7640 (Others) SW REGULATOR
  - ND-702V# EXTERNAL PADDLE
    - ND-706X (TEC-7300G)
ND-702X (Others) EXTERNAL PADDLE

Units with # mark differ according to the model.
See page 1.12 for units with # mark.

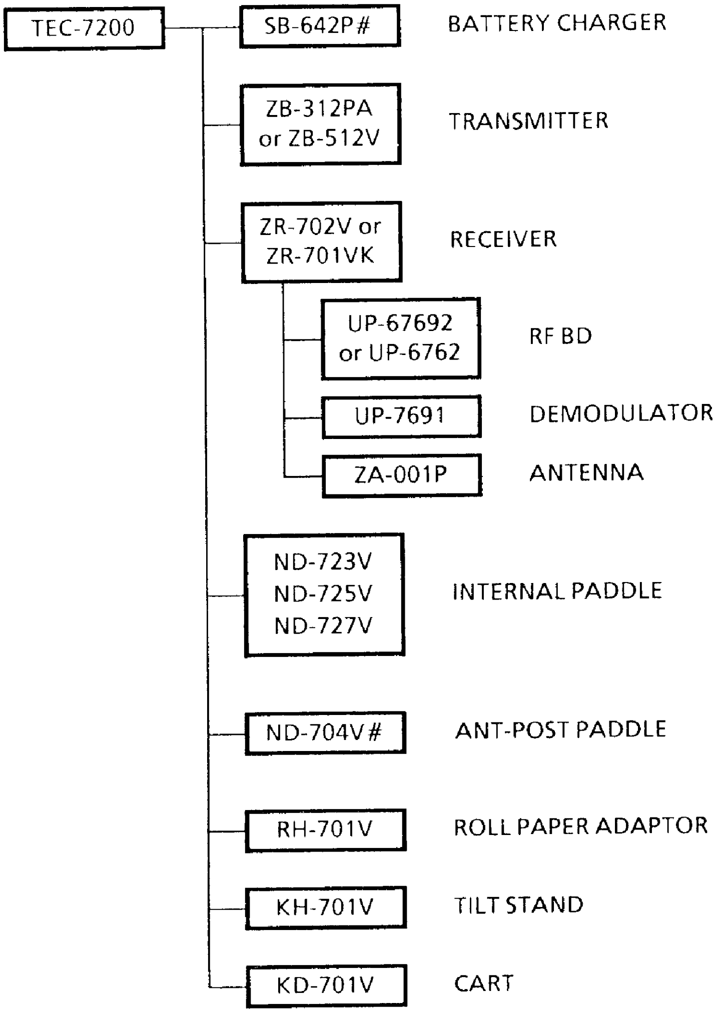
1-3-2 Optional Units

TEC-7100 series


TEC-7100
SB-642P#
BATTERY CHARGER
ZB-312PA or ZB-512V
TRANSMITTER
ZR-702V or ZR-701VK
RECEIVER
UP-67692 or UP-6762
RF
UP-7691
DEMODULATOR
ZA-001P
ANTENNA
RH-701V
ROLL PAPER ADAPTOR
KH-701V
TILT STAND
KD-701V
CART

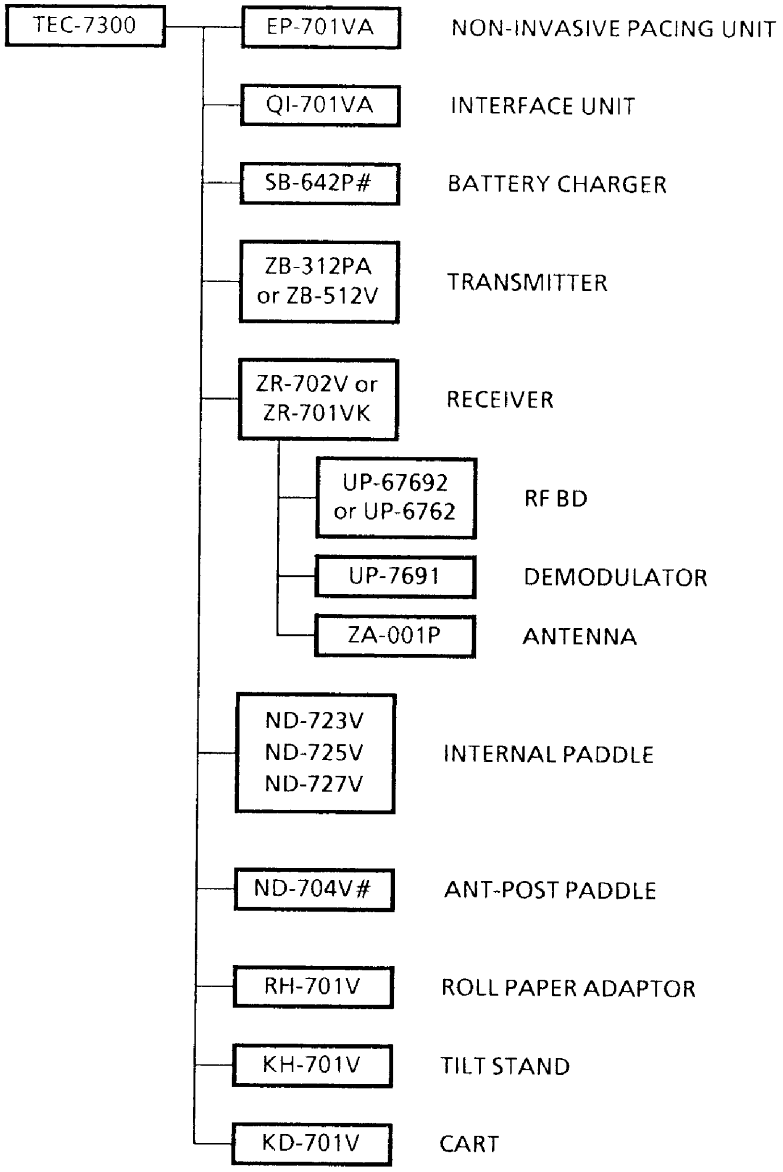
Units with # mark differ according to the model.
See page 1.10 for units with # mark.

TEC-7200 series


TEC-7200
SB-642P#
BATTERY CHARGER
ZB-312PA or ZB-512V
TRANSMITTER
ZR-702V or ZR-701VK
RECEIVER
UP-67692 or UP-6762
RF BD
UP-7691
DEMODULATOR
ZA-001P
ANTENNA
ND-723V
ND-725V
ND-727V
INTERNAL PADDLE
ND-704V#
ANT-POST PADDLE
RH-701V
ROLL PAPER ADAPTOR
KH-701V
TILT STAND
KD-701V
CART

Units with # mark differ according to the model.
See page 1.11 for units with # mark.

TEC-7300 series


TEC-7300
EP-701VA
NON-INVASIVE PACING UNIT
QI-701VA
INTERFACE UNIT
SB-642P#
BATTERY CHARGER
ZB-312PA or ZB-512V
TRANSMITTER
ZR-702V or ZR-701VK
RECEIVER
UP-67692 or UP-6762
RF BD
UP-7691
DEMODULATOR
ZA-001P
ANTENNA
ND-723V ND-725V ND-727V
INTERNAL PADDLE
ND-704V#
ANT-POST PADDLE
RH-701V
ROLL PAPER ADAPTOR
KH-701V
TILT STAND
KD-701V
CART

Units with # mark differ according to the model.
See page 1.12 for units with # mark.

1-3-3 System Component Table

TEC-7100 series

	TEC-7100A	TEC-7100B	TEC-7100C	TEC-7100E	TEC-7100F	TEC-7100G	TEC-7100H	TEC-7100J	TEC-7100K	TEC-7100R
AC Line Voltage	117V	240V	220V	220V	220V	220V	220V	100/110/117V	220/240V	220V
AC Line Frequency	60Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50/60Hz	50/60Hz	50Hz
Chassis parts	YZ-000G8	YZ-000G9	YZ-001G0	YZ-001G6	YZ-001G1	YZ-001G2	YZ-001G8	YZ-001G4	YZ-001G5	YZ-001G3
External paddle	ND-701V	ND-701V	ND-701V	ND-701VE	ND-701VF	ND-701VG	ND-701VH	ND-701V	ND-701V	ND-701VR
Power unit	SC-701VA	SC-701VB	SC-701VC	SC-701VE	SC-701VF	SC-701VG	SC-701VH	SC-701VJ	SC-701VK	SC-701VR
Recorder unit	WS-701VA	WS-701VA	WS-701VC	WS-701VE	WS-701VF	WS-701VG	WS-701VH	WS-701VA	WS-701VA	WS-701VR
VR and connector BD	UP-76391	UP-76392	UP-76392	UP-76397	UP-76395	UP-76393	UP-76398	UP-76392	UP-76392	UP-76396
ECG/CPU BD with ROM	US-76353	US-76355	US-76355	US-76359	US-7635A	US-76357	US-7635K	US-76355	US-76355	US-7635B
High voltage BD	UP-7636	UP-7636	UP-7636	UP-7636	UP-7636	UP-7851	UP-7636	UP-7636	UP-7636	UP-7636
Relay BD	-----	-----	-----	-----	-----	UP-7850	-----	-----	-----	-----
Test detect BD	UP-7596	UP-7596	UP-7596	UP-7596	UP-7596	UP-7596G	UP-7596	UP-7596	UP-7596	UP-7596
Transmitter	ZB-312PA	-----	ZB-512V	-----	-----	-----	-----	ZB-512V	ZB-512V	-----
Receiver	ZR-702V	-----	ZR-701VK	-----	-----	-----	-----	ZR-701VK	ZR-701VK	-----
Battery charger	SB-642PA	SB-642PK	SB-642PK	-----	-----	-----	-----	SB-642PK	SB-642PK	-----

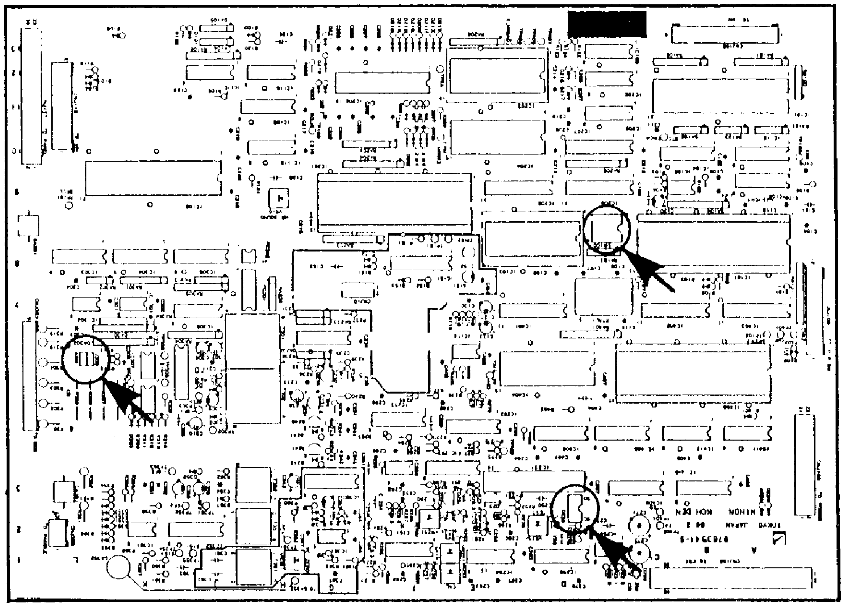
TEC-7200 Series

	TEC-7200A	TEC-7200B	TEC-7200C	TEC-7200E	TEC-7200F	TEC-7200G	TEC-7200H	TEC-7200J	TEC-7200K	TEC-7200R
AC Line Voltage	117V	240V	220V	220V	220V	220V	220V	100 / 110 / 117V	220/240V	220V
AC Line Frequency	60Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50/60Hz	50/60Hz	50Hz
Chassis parts	YZ-002G1	YZ-002G2	YZ-002G3	YZ-002G9	YZ-002G4	YZ-002G5	YZ-003G1	YZ-002G7	YZ-002G8	YZ-002G6
External paddle	ND-702V	ND-702V	ND-702V	ND-702VE	ND-702VF	ND-702VG	ND-702VH	ND-702V	ND-702V	ND-702VR
Internal paddle	ND-704V	ND-704V	ND-704V	ND-704VE	ND-704VF	ND-704VG	ND-704VH	ND-704V	ND-704V	ND-704VR
Power unit	SC-701VA	SC-701VB	SC-701VC	SC-701VE	SC-701VF	SC-701VG	SC-701VH	SC-701VJ	SC-701VK	SC-701VR
Recorder unit	WS-701VA	WS-701VA	WS-701VC	WS-701VE	WS-701VF	WS-701VG	WS-701VH	WS-701VA	WS-701VA	WS-701VR
VR and connector BD	UP-76391	UP-76392	UP-76392	UP-76397	UP-76395	UP-76393	UP-76398	UP-76392	UP-76392	UP-76396
ECG/CPU BD with ROM	US-76352	US-76354	US-76354	US-76358	US-7635F	US-76356	US-7635J	US-76354	US-76354	US-7635R
High voltage BD	UP-7636	UP-7636	UP-7636	UP-7636	UP-7636	UP-7851	UP-7636	UP-7636	UP-7636	UP-7636
Relay BD	-----	-----	-----	-----	-----	UP-7850	-----	-----	-----	-----
Test detect BD	UP-7596	UP-7596	UP-7596	UP-7596	UP-7596	UP-7596G	UP-7596	UP-7596	UP-7596	UP-7596
Transmitter	ZB-312PA	-----	ZB-512V	-----	-----	-----	-----	ZB-512V	ZB-512V	-----
Receiver	ZR-702V	-----	ZR-701VK	-----	-----	-----	-----	ZR-701VK	ZR-701VK	-----
Battery charger	SB-642PA	SB-642PK	SB-642PK	-----	-----	-----	-----	SB-642PK	SB-642PK	-----

TEC-7300 Series

	TEC-7300A	TEC-7300C	TEC-7300E	TEC-7300G	TEC-7300J	TEC-7300K
AC Line Voltage	117V	220V	220V	220V	100 / 110 / 117V	220 / 240V
AC Line Frequency	60Hz	50Hz	50Hz	50Hz	50 / 60Hz	50 / 60Hz
Chassis parts	YZ-003G4					
External paddle	ND-702V	ND-702V	ND-702VE	ND-702VG	ND-702V	ND-702V
Internal paddle	ND-704V	ND-704V	ND-704VE	ND-704VG	ND-704V	ND-704V
Power unit	SC-701VA	SC-701VC	SC-701VE	SC-701VG	SC-701VJ	SC-701VK
Recorder unit	WS-702VA	WS-702VC	WS-702VE	WS-702VG	WS-702VA	WS-702VA
VR and connector BD	UP-76391	UP-76392	UP-76397	UP-76393	UP-76392	UP-76392
ECG/CPU BD with ROM	US-7737	US-7737	US-77372	US-77371	US-7737	US-7737
High voltage BD	UP-7636	UP-7636	UP-7636	UP-7851	UP-7636	UP-7636
Relay BD	-----	-----	-----	UP-7850	-----	-----
Test detect BD	UP-7596	UP-7596	UP-7596	UP-7596G	UP-7596	UP-7596
Transmitter	ZB-312PA	ZB-512V	-----	-----	ZB-512V	ZB-512V
Receiver	ZR-702V	ZR-701VK	-----	-----	ZR-701VK	ZR-701VK
Battery charger	SB-642PA	SB-642PK	-----	-----	SB-642PK	SB-642PK

1-4 Internal Switch Setting (ECG/CPU Board)



SW100 Mode select switch (Not mounted on TEC-7300)

No.	ON	OFF
1, 2	Not used	Not used
3	Synchronization mode is not released when the energy is discharged (Initial setting for other than TEC-7100 / 7200A).	Synchronization mode is re-leased when the energy is dis-charged. For the next cardiover-sion, press the SYNC button again (Initial setting for TEC-7100 / 7200A).
4	TEC-7100	TEC-7200

SW102 AC filter frequency select switch

No.	ON	OFF
1, 2	60Hz	50Hz

J300 ECG connection cable select socket

AAMI	The other position
TEC-7100 / 7200/7300A	Other than TEC-7100 / 7200/7300A

Section 2 SPECIFICATIONS

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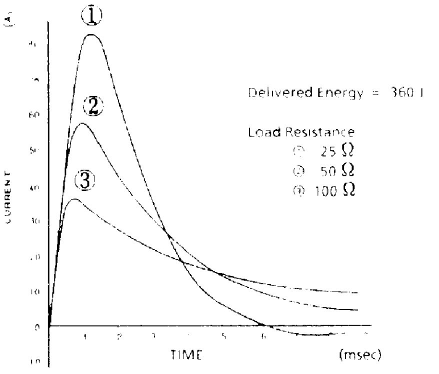
Monitor Section 2.4
Recorder Section 2.5
Battery 2.6
External Paddle 2.7
General 2.8

◆ DEFIBRILLATOR SECTION

Output Energy:	3, 5, 10, 20, 30, 50, 70, 100, 150, 200, 300, and 360J (at 50Ω load)
Energy Limit:	50 J max. for the internal paddles
Output Waveform:	Edmark 
Charging Time:	≦10 sec (AC power supply) ≦12 sec (Fully charged new battery)
Synchronization Trigger:	I, II, III, aV_R, aV_L, aV_F, V, test, and external ECG Paddle sychronization is available according to the DIP switch setting.
Discharge Test:	"TEST OK" is displayed on the CRT when energy of 50 J is normally discharged to the built-in test load. If energy of other than 50J is discharged to the test load, "NG (TEST AT 50J)" is displayed.
Charge Status Indication:	LED indicator on the main unit and paddle During charging: Blinks After charge is complete: Lit Energy value display on the CRT During charging: Blinks After charge is complete: Lit Continuous tone is emitted after charge is complete.
Discharge Timing:	≦30 msec after discharge buttons are pressed (async mode) ≦30 msec after a synchronized point (sync mode)

Automatic Internal Discharge:	Stored energy is internally discharged in the following cases: 40sec (± 5sec) after charging starts. Power is turned off. Energy selector is set to ECG/MON. 300 msec after energy discharge when the power source is changed from AC to battery during energy charging. Paddles are disconnected from the main unit.
Automatic Synchronization Reset:	Sync mode is automatically turned off (async mode) when the energy is discharged (TEC-7100/7200/7300A).
Paddle Contact Impedance: (TEC-7200/7300)	Indicated by three colored LEDs on the sternum paddle. Green: 0 to 100Ω Yellow: 100 to 200Ω Red: ≧200Ω
Transthoracic Resistance: (TEC-7200/7300)	Printed when energy is discharged to the patient.
Delivered Energy: (TEC-7200/7300)	Printed when energy is discharged to the patient.

◆ ECG AMPLIFIER SECTION

Input:	5-electrode mode: Paddle, telemetry (when the receiver is connected), I, II, III, aVR, aVL, aVF, V, external input,and test 3-electrode mode: Paddle, telemetry (when the receiver is connected, TEC-7300), I, II, III, and test
Gain:	×1/2, ×1, ×2, × 4 and ×AG (Auto Gain)
Frequency Response:	0.5 to 100 Hz (through ECG electrodes, MON mode) 0.05 to 100 Hz (through ECG electrodes, ECG mode) 0.5 to 30 Hz (through paddles)
CMRR:	≧95 dB
Input Impedance:	≧5 MΩ at 10 Hz, through ECG electrodes ≧100 KΩ at 10 Hz, through paddles
Patient Leakage Current:	≦10 μA
Internal Noise:	≦35 μVp-p , referred to input
Skinvoltage Tolerance:	≧ ±300 mV
Leads Off Alarm:	Detected by electrode detachment
AC Filter:	Provided
Pacing Pulse Rejection:	Provided
External Input:	10 mm/V on CRT at gain of ×1
External Output:	1 V/mV
QRS Sync Sound:	Provided with a sound level adjustment
Calibration Waveform:	Square waveform of 1 mV (referred to input)
Test Waveform:	QRS simulated waveform of approx. 1 mV, 100 msec and 60 bpm
Heart Rate Count Range:	12 to 300 bpm
Heart Rate Alarm:	
High limit:	15 to 300 bpm, 5 bpm/step, and off
Low limit:	15 to 295 bpm, 5 bpm/step, and off
VPC Rate Count Range: (TEC-7300)	0 to 99 bpm
VPC Rate Alarm: (TEC-7300)	1 to 99 bpm, 1 bpm/step, and off

◆ MONITOR SECTION

*: When the QI-701VA is used

CRT:	Non-fade, 5.5 inches, electromagnetic deflection type
Effective Display Area:	100H × 85V (mm)
Display Method:	Non-fade, X-Y display
Sweep Speed:	25 mm/sec
Sweep Length:	100 mm
Frequency Response:	DC to 30 Hz (−3 dB)
Max. Waveform Deflection:	40 mm / trace
Baseline Position:	Fixed
Sync Mark	Spot display on a QRS waveform in SYNC mode
Display Mode:	Monitor mode, system set mode, and alarm set mode (TEC-7300) Monitor mode (TEC-7100/7200)
Monitor mode:	
(TEC-7100/7200)	
Cascaded ECG mode:	Displays ECG and cascaded ECG waveform
(TEC-7300)	
Cascaded ECG mode:	Displays ECG and cascaded ECG waveform
VPC Mode:	Displays ECG and VPC frozen / recall waveform, VPC detected time, arrhythmia status, and lead
Recall File Capacity:	10 files
Arrhythmia Status:	Asystole, ventricular fibrillation, ventricular tachycardia, VPC run, couplet, bigeminy, and early VPC
Heart Rate Trend Mode:	Displays ECG and heart rate trendgraph Trendgraph includes maxi-mum, minimum and mean heart rate
VPC Trend Mode:	Displays ECG and VPC trendgraph Trendgraph includes VPC rate and mean heart rate
BP Mode: *	Displays ECG and blood pressure waveform
BP Trend Mode: *	Displays ECG and blood pressure trendgraph Trendgraph includes systolic, diastolic, and mean pressure
Trend Time:	2 min, 1, 2, 4, 8, and 24 hour
Trend Data:	60 samples
System Set Mode: (TEC-7300)	
Set Item:	Trend time, periodic record, pacing rejection on/off, discharge summention print, tabular trend on/off, paper speed, ECG record mode (realtime/delayed), and date and time set.
Alarm Set Mode: (TEC-7300)	
Set Item:	Heart rate high and low limit, VPC rate limit, arrhythmia level, alarm record on/off, and systolic pressure limit *
Arrhythmia Level:	Level 1, level 2 and off
Level 1:	Asystole, ventricular fibrillation, ventricular tachycardia, and VPC run
Level 2:	Besides level 1, couplet, bigeminy, and early VPC

◆ RECORDER SECTION

Recording Item:	Realtime ECG waveform, delayed ECG waveform, and frozen waveform (TEC-7100/7200/7300), recall waveform, trendgraph with/without tabular trend, and discharge summention (TEC-7300)
Paper Speed:	25 mm/sec ± 10% (TEC-7100/7200/7300) 5 mm/sec ± 15% and 5 & 25 mm/sec alternate selection: (TEC-7300)
Effective Recording Width:	40 mm (waveform) , 3 mm/line (characters)
Frequency Response:	DC to 80 Hz (– 3dB)
Auto Recording:	
Energy Charge Recording:	Records for approx. 15 sec when starting energy charge.
Alarm Recording:	Records for approx. 15 sec when an alarm occurs.
Periodic Recording: (TEC-7300)	Records for 10 sec at the interval of 1, 10, 15, 30 min, or 1 hour.
Annotation Printing:	Following items are printed on the upper and lower margin. Items to be annotated depend on the display mode. Discharge mark, selected energy, lead, sensitivity, heart rate, MON/ECG mode, AC filter on/off, REAL/DELAY mode, SYNC mode, sync mark, date, and time (TEC-7100/7200/7300) Transthoracic resistance and delivered energy (TEC-7200/7300)
Recording Paper:	Z-fold paper, type FQS50-3-100, 50 mm × 30 m Roll paper, type RQS50-3, 50 mm × 30 m (requires the optional roll paper adaptor RH-701V)
Paper Empty Sensor:	When the paper is used up, recording stops, intermittent tone is emitted, and "PAPER EMPTY" is displayed on the CRT.

◆ BATTERY

Battery: LCT-1912NK, lead acid type

Battery Charging Time: Approximately 2 hours for 80 % charging, and 15 hours for full charge

Automatically changed from rapid charging mode to trickle charging mode when fully charged

Capacity: 1.9 AH (20 HR)

≧ 30 times discharge of 360 J by fully charged new battery

≧ 1 hour continuous monitoring by fully charged new battery

Battery Charge Indicator: Lit (during charging)

Battery Level Indicator: Battery level is indicated by three LEDs.

"LOW BATTERY" is displayed on the CRT when the level is low.

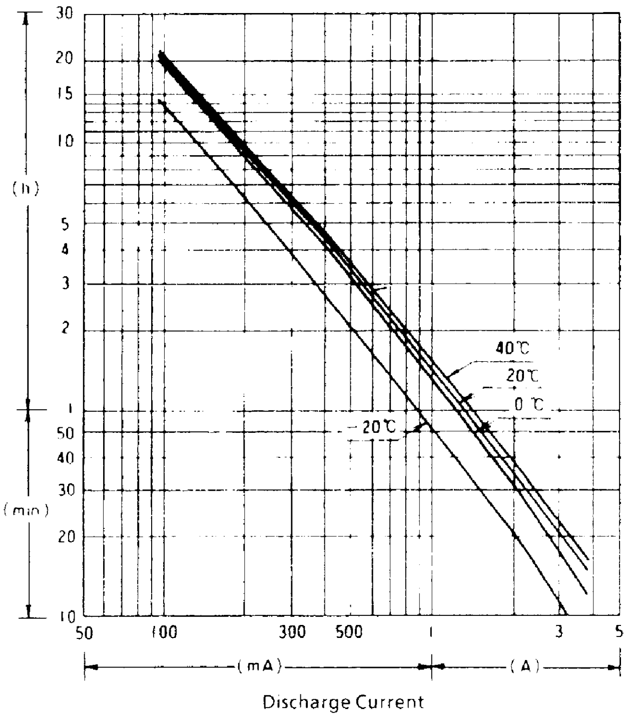
Over-discharge Protector: Turns off the power when the battery level becomes close to empty to prevent the battery from over-discharge.

Self-discharge: Battery capacity naturally decreases at temperature of 20°C without using as follows.

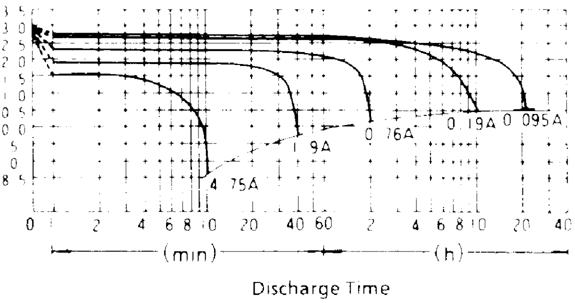
3 months: 90 %
6 months: 80 %
12 months: 60 %

Characteristics:

Relationship between discharge current and time at various temperature

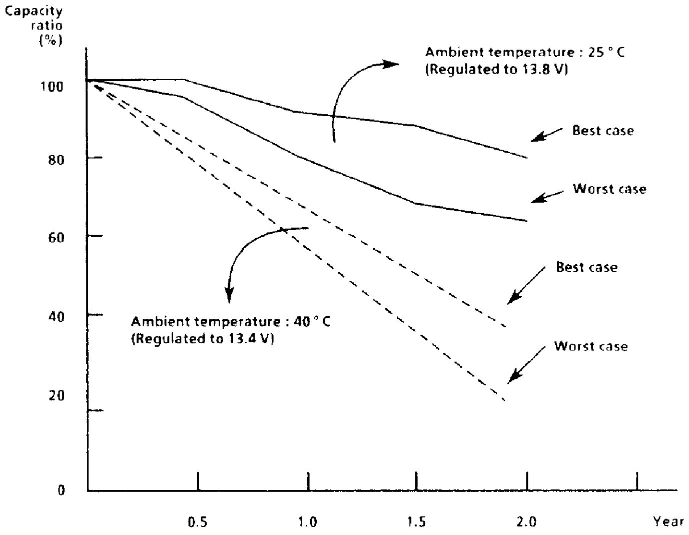


Discharge Characteristic (at 20°C)



Monitoring:	Approx. 1A
Recording:	Approx. 0.5A
Energy charging:	Approx. 8A

Lifetime in Trickle Charging



◆ EXTERNAL PADDLE

Electrode Size:	70×106 mm (Adult), 45,8×53.8 mm (Pediatric)
Cable Length:	2.5 m

◆ GENERAL

Operating Temperature:	0~35°C
Power Requirement:	Refer to System Component Table (Pg. 1.10 to 1.12).
Power Consumption:	<200VA (TEC-7100/7200) <250VA (TEC-7300)
Dimensions:	344W × 195H × 370D mm (excluding paddles)
Net Weight:	12.3 kg (including paddles, TEC-7100/7200) 12.8 kg (including paddles, TEC-7300)

Section 3 THEORY OF OPERATION

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Relay Control 3.80
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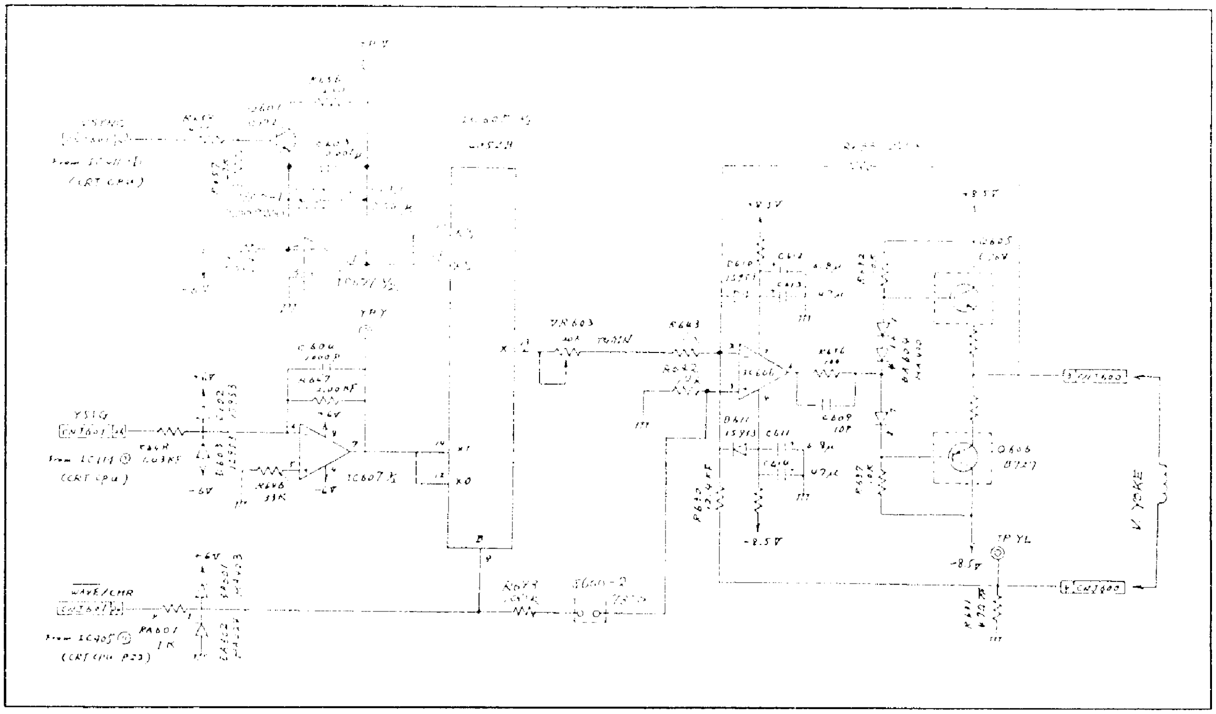
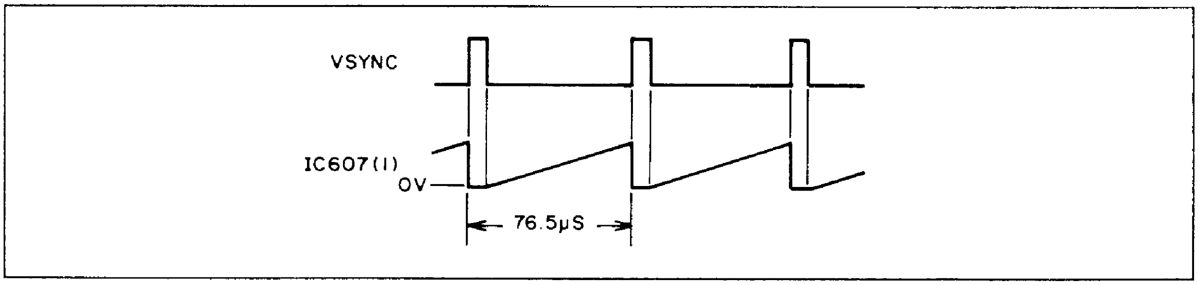
Vertical Deflection Driver


VSYNC
YSIG
WAVE/CHR
VR603
R643
IC606
IC607
Q605
Q606
C609
TP YL
V YOKE
-8.5V
-6V
+6V

Character Display Mode

VSYNC triggers the integrator IC607-1 to generate a sawtooth waveform which is amplified by IC606 and Q605~606 to drive the vertical deflection yoke for the vertical scan. While VSYNC is high, Q601 turns on, and IC607-1 is reset to 0V. While low, C603 is charged by −6V to generate a positive sawtooth. Multiplexer IC605-2 selects X2/X3 when WAVE/CHAR is high.

Vertical Scan Sawtooth


VSYNC
IC607(1)
OV
76.5μS

Waveform Display Mode

D/A converted ECG waveform YSIG is amplified by IC607-2 with a gain of 1.4. High-cut filter of 80Hz consists of R647 and C604 to smooth the waveform. Multiplexer IC605-2 selects X0/X1 when WAVE/CHAR is low.

Driver

In the character display mode, when the input voltage of IC606 starts increasing, the output decreases, the base voltage of Q605~606 decreases, the emitter voltage becomes negative, the current flows from CNJ600-4 to CNJ600-3 through the yoke, and the scan is initiated slightly above the top of the character display area. In the waveform display mode, the YSIG controls the vertical yoke current in the same manner. IC606 has two feedback loops. The main feedback is through R630, and the yoke is delayed due to the inductance of the yoke. The feedback through R633 and VR607 compensates this delay to initiate the beam quickly. The amount of the compensation feedback is adjusted with VR607 for the distortion adjustment of characters in the top area. The vertical deflection width is adjusted by VR603.

Jumper Setting for Instrument Type

The jumper J600 is set according to the type of instrument, TEC-7100/7200 or TEC-7300. This selection determines the deflection amplitude (J600-1) and the vertical position (J600-2) of the vertical scan in the character display mode.

	TEC-7100/7200	TEC-7300
J600-1	ON	OFF
J600-2	OFF	ON

3-1 System Overview

This defibrillator is controlled by three CPUs : host CPU, ECG CPU and CRT CPU. The host CPU mainly controls other CPUs and transfers the data among them. Refer to block diagrams on the following pages.

ECG signal processing

The host CPU sends the data such as key status to the ECG RAM. According to this data, the ECG CPU controls the ECG amplifier and A/D converter. An interrupt signal sent regularly from the host CPU to the ECG CPU allows the A/D convertor to start conversion. The converted data is transferred to the host CPU through the ECG RAM. A leads-off signal and a paddle contact impedance signal are also sent to the host CPU.

The ECG CPU detects a QRS synchronization point, and calculates the heart rate for the host CPU. In the TEC-7300, the ECG CPU also detects VPCs and calculates the VPC rate.

CRT display

The host CPU sends data such as key status, waveform, and characters to the CRT CPU through the CRT RAM in a certain cycle. The CRT CPU generates control signals such as sync signal and blanking signal to display waveforms and characters.

Recorder

When the host CPU recognizes that the record key is pressed, the host CPU sends the control signals to the motor control board which controls the rotation of the paper feed motor at a constant speed. The host CPU also sends the serial data to the thermal head to print characters and waveforms.

Energy Charge

The energy charge/discharge is controlled by host CPU according to the key status. The host CPU sends the charge control signal through the I/O port to the energy charge circuit to supply high voltage to the energy capacitor in the high voltage block. During charging, the charged energy is monitored by the host CPU through the A/D converter. When discharged, the energy detected by the TTR circuit is A/D converted and the host CPU calculates the delivered energy (TEC-7200/7300). When discharged to the test load, the host CPU recognizes whether the test discharge has been done normally or not through the test detection circuit.

Key Entry and LED display

The host CPU recognizes key on/off status through the key/LED interface by scanning and I/O port. The LED display is also controlled by the key/LED interface.

Host CPU

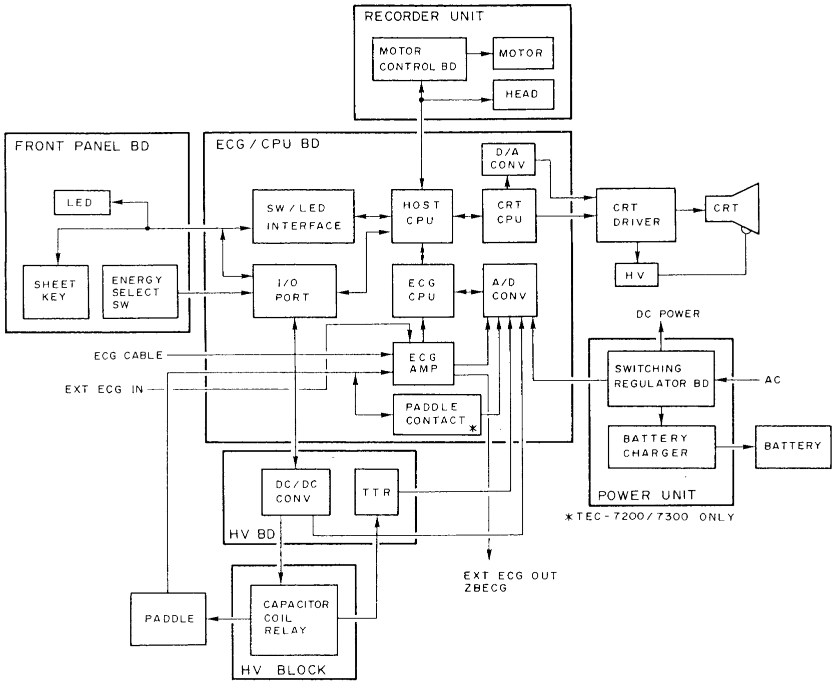
Besides the above, the host CPU controls the various kinds of sound, communicates with the real-time clock and reads the DIP switch setting. When the host CPU runs away and the absence of certain pulses is detected, all CPUs are reset.

Power Unit

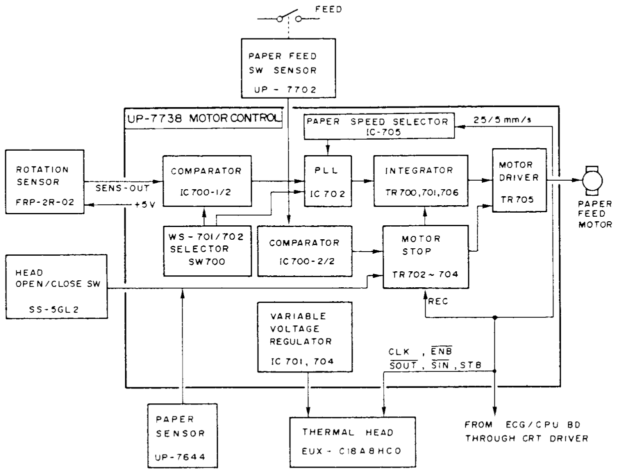
The switching regulator supplies power to all units on AC line or battery. The supply voltage of the power unit is monitored by the host CPU. The battery is charged in the cycle or trickle charging mode.

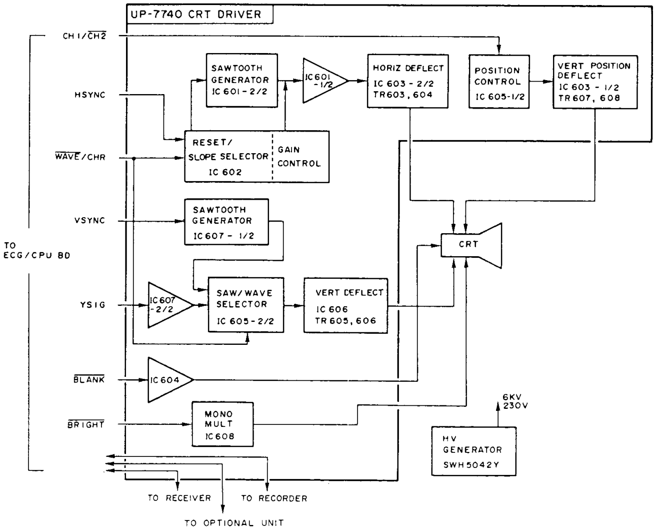
3-2 Block Diagrams

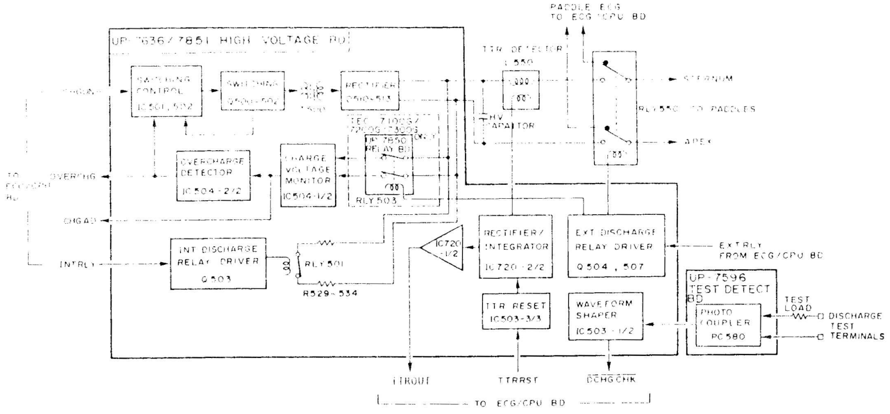
System Block Diagram

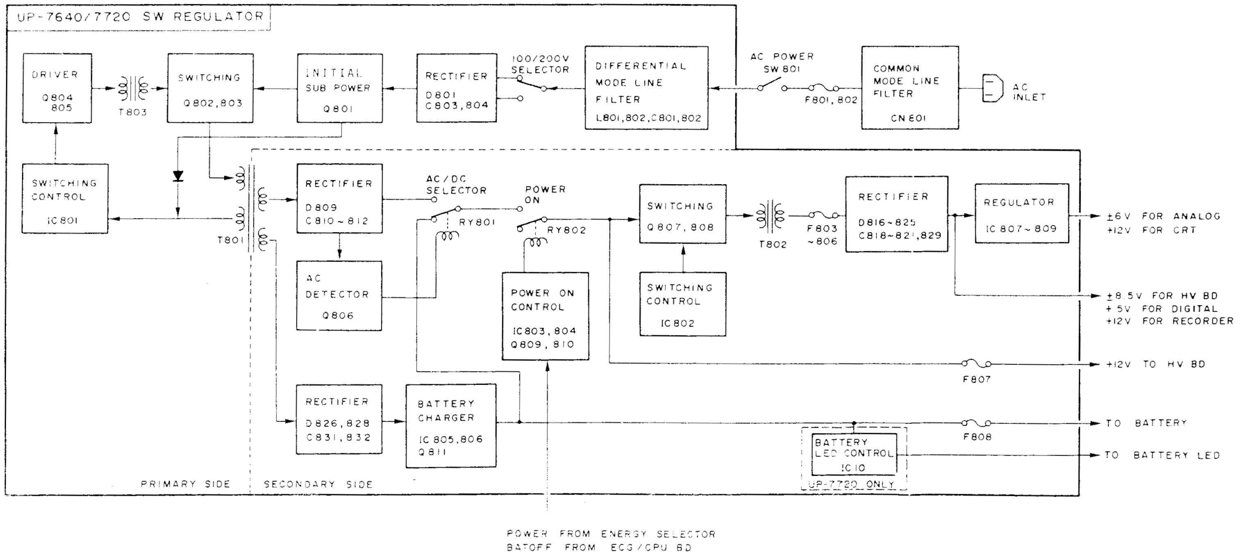

RECORDER UNIT
MOTOR CONTROL BD
MOTOR
HEAD
FRONT PANEL BD
LED
SHEET KEY
ENERGY SELECT SW
ECG/CPU BD
D/A CONV
SW/LED INTERFACE
HOST CPU
CRT CPU
CRT DRIVER
CRT
HV
I/O PORT
ECG CPU
A/D CONV
DC POWER
ECG CABLE
ECG AMP
EXT ECG IN
PADDLE CONTACT *
SWITCHING REGULATOR BD
AC
BATTERY CHARGER
BATTERY
POWER UNIT
*TEC-7200/7300 ONLY
DC/DC CONV
TTR
HV BD
EXT ECG OUT
ZBECG
PADDLE
CAPACITOR
COIL
RELAY
HV BLOCK

Detailed Block Diagram

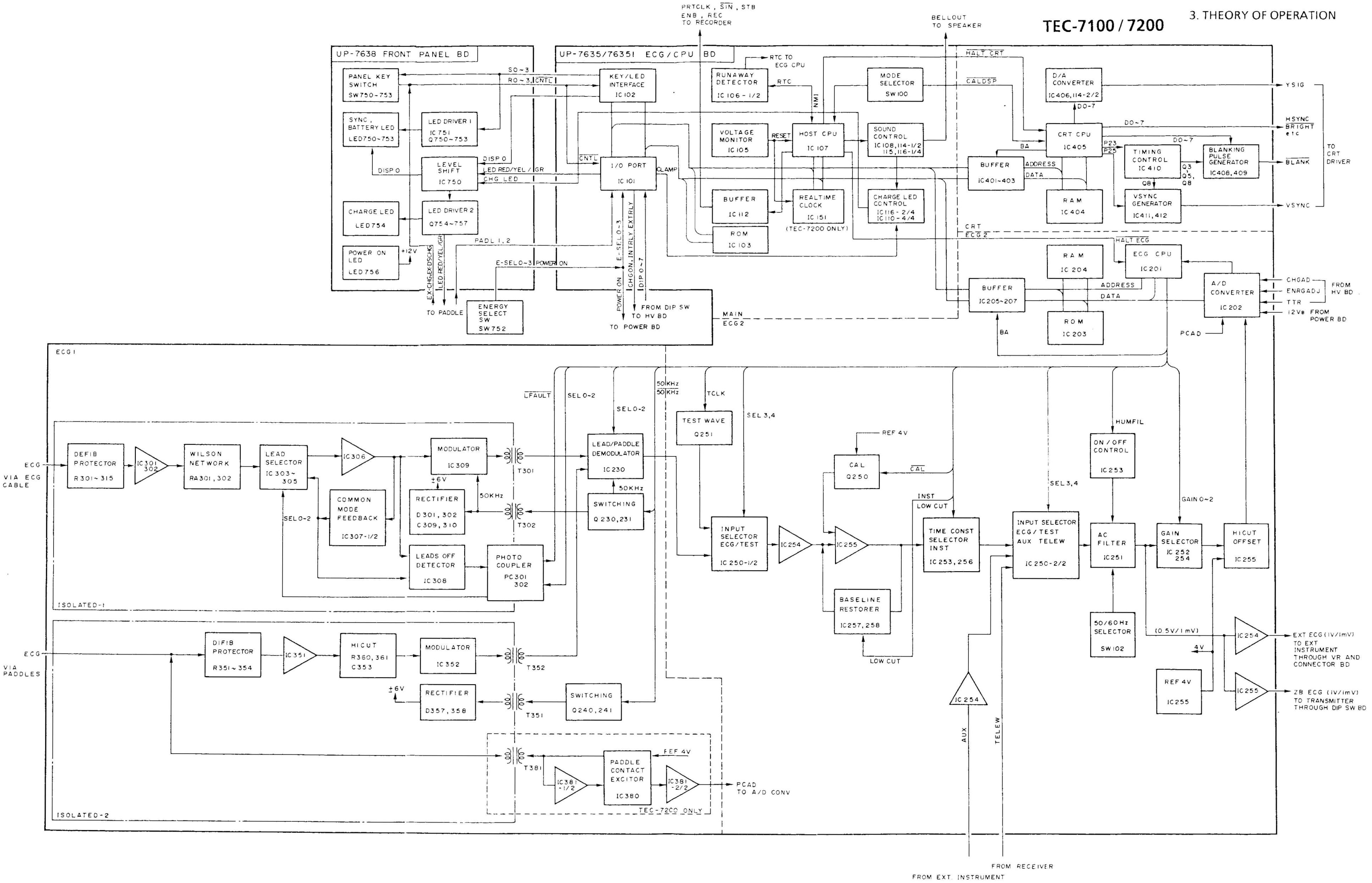

FEED
PAPER FEED SW SENSOR
UP - 7702
UP-7738 MOTOR CONTROL
PAPER SPEED SELECTOR IC-705
25/5 mm/s
ROTATION SENSOR
FRP-2R-02
SENS-OUT
+5V
COMPARATOR
IC 700-1/2
PLL
IC 702
INTEGRATOR
TR 700, 701, 706
MOTOR DRIVER
TR 705
PAPER FEED MOTOR
WS-701/702 SELECTOR
SW700
COMPARATOR
IC 700-2/2
MOTOR STOP
TR 702 ~ 704
HEAD OPEN/CLOSE SW
SS-5GL2
REC
VARIABLE VOLTAGE REGULATOR
IC 701, 704
CLK, $\overline{\text{ENB}}$
$\overline{\text{SOUT}}$, $\overline{\text{SIN}}$, STB
PAPER SENSOR
UP-7644
THERMAL HEAD
EUX - C18A8HCO
FROM ECG/CPU BD
THROUGH CRT DRIVER


UP-7740 CRT DRIVER
CH1/$\overline{\text{CH2}}$
HSYNC
$\overline{\text{WAVE}}$/CHR
VSYNC
YSIG
$\overline{\text{BLANK}}$
$\overline{\text{BRIGHT}}$
TO ECG/CPU BD
SAWTOOTH GENERATOR
IC 601-2/2
IC601 -1/2
HORIZ DEFLECT
IC 603 - 2/2
TR603, 604
POSITION CONTROL
IC 605-1/2
VERT POSITION DEFLECT
IC 603 - 1/2
TR607, 608
RESET/
SLOPE SELECTOR
IC 602
GAIN CONTROL
SAWTOOTH GENERATOR
IC607 - 1/2
CRT
IC607 -2/2
SAW/WAVE SELECTOR
IC 605-2/2
VERT DEFLECT
IC 606
TR605, 606
IC604
MONO MULT
IC608
6KV
230V
HV GENERATOR
SWH5042Y
TO RECEIVER
TO RECORDER
TO OPTIONAL UNIT

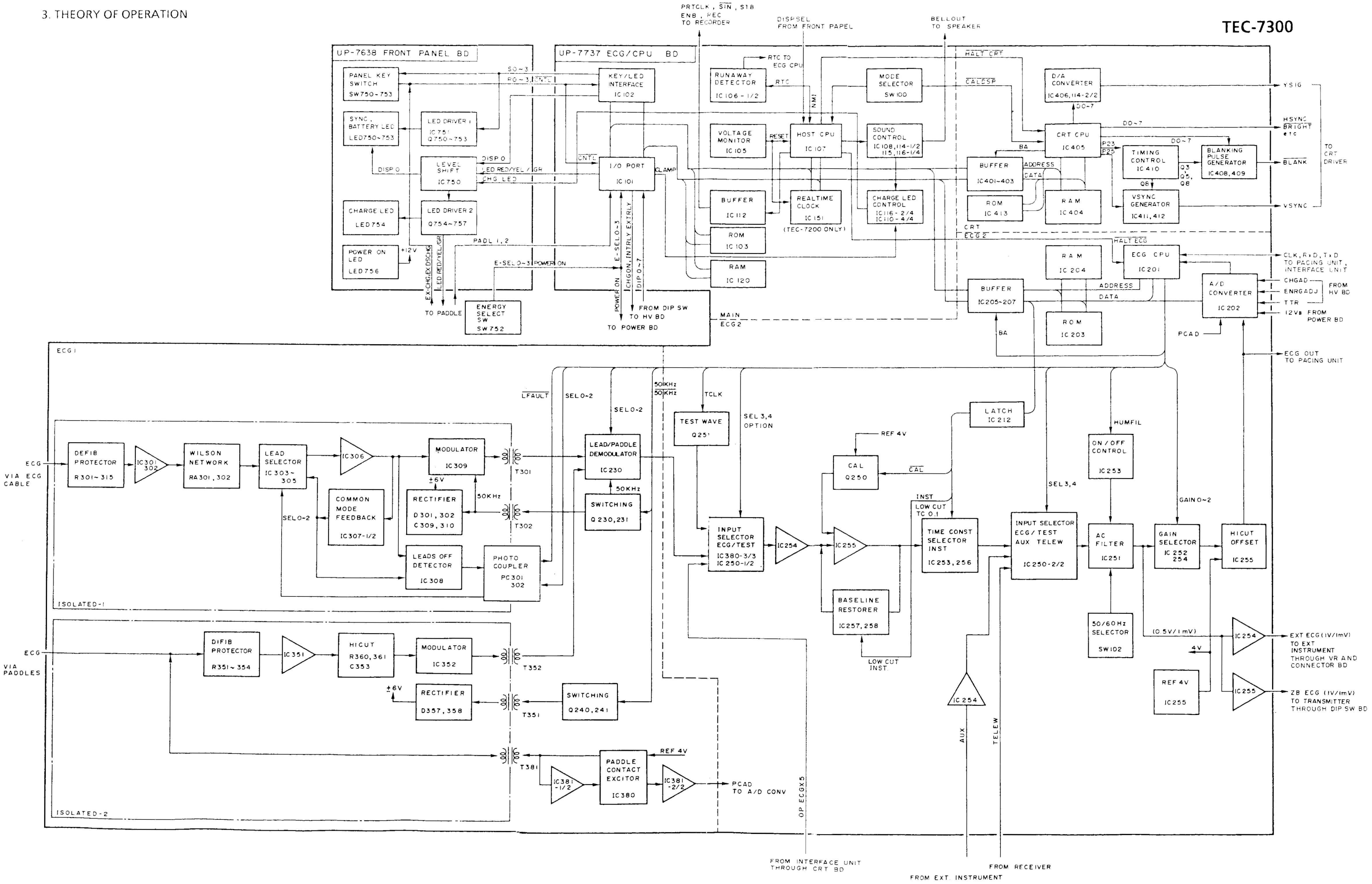

UP-7636/7851 HIGH VOLTAGE BD
SWITCHING CONTROL IC501, 502
SWITCHING Q500~502
T500
RECTIFIER D510~513
TEC-7100G/7200G/7300G ONLY
UP-7850 RELAY BD
RLY503
OVERCHARGE DETECTOR IC504-2/2
CHARGE VOLTAGE MONITOR IC504-1/2
CHGON
TO ECG/CPU BD
OVERCHG
CHGAD
INTRLY
INT DISCHARGE RELAY DRIVER Q503
RLY501
R529~534
IC720-1/2
RECTIFIER/INTEGRATOR IC720-2/2
EXT DISCHARGE RELAY DRIVER Q504, 507
TTR RESET IC503-3/3
WAVEFORM SHAPER IC503-1/2
TTR DETECTOR L550
HV CAPACITOR
PADDLE ECG TO ECG/CPU BD
STERNUM
RLY550 TO PADDLES
APEX
EXTRLY FROM ECG/CPU BD
UP-7596 TEST DETECT BD
PHOTO COUPLER PC580
TEST LOAD
DISCHARGE TEST TERMINALS
TTROUT
TTRRST
DCHGCHK
TO ECG/CPU BD


UP-7640/7720 SW REGULATOR
DRIVER Q804 805
T803
SWITCHING Q802,803
INITIAL SUB POWER Q801
RECTIFIER D801 C803,804
100/200V SELECTOR
DIFFERENTIAL MODE LINE FILTER L801,802,C801,802
AC POWER SW801
F801,802
COMMON MODE LINE FILTER CN601
AC INLET
SWITCHING CONTROL IC801
T801
RECTIFIER D809 C810~812
AC/DC SELECTOR
RY801
POWER ON
RY802
AC DETECTOR Q806
POWER ON CONTROL IC803,804 Q809,810
SWITCHING Q807,808
SWITCHING CONTROL IC802
T802
F803 ~806
RECTIFIER D816~825 C818~821,829
REGULATOR IC807~809
±6V FOR ANALOG
+12V FOR CRT
±8.5V FOR HV BD
+5V FOR DIGITAL
+12V FOR RECORDER
+12V TO HV BD
F807
RECTIFIER D826,828 C831,832
BATTERY CHARGER IC805,806 Q811
F808
TO BATTERY
BATTERY LED CONTROL IC10
UP-7720 ONLY
TO BATTERY LED
PRIMARY SIDE
SECONDARY SIDE
POWER FROM ENERGY SELECTOR
BATOFF FROM ECG/CPU BD

TEC-7100 / 7200


PRTCLK, SIN, STB
ENB, REC
TO RECORDER
BELLOUT
TO SPEAKER
UP-7638 FRONT PANEL BD
UP-7635/76351 ECG/CPU BD
PANEL KEY SWITCH SW750~753
SYNC, BATTERY LED LED750~753
LED DRIVER 1 IC751 Q750~753
LEVEL SHIFT IC750
CHARGE LED LED754
LED DRIVER 2 Q754~757
POWER ON LED LED756
+12V
ENERGY SELECT SW SW752
TO PADDLE
EX-CHG,EX-DSCHG
LED RED/YEL/GR
PADL 1, 2
E-SEL0~3
POWER ON
S0~3
R0~3, CNTL
DISP 0
LED RED/YEL/GR
CHG LED
KEY/LED INTERFACE IC102
CNTL
I/O PORT IC101
CLAMP
E-SEL0~3
CHGON, INTRLY, EXTRLY
DIP 0~7
POWER ON
TO HV BD
FROM DIP SW
TO POWER BD
RUNAWAY DETECTOR IC106-1/2
RTC TO ECG CPU
RTC
NMI
VOLTAGE MONITOR IC105
RESET
HOST CPU IC107
MODE SELECTOR SW100
SOUND CONTROL IC108, 114-1/2, 115, 116-1/4
BUFFER IC112
REALTIME CLOCK IC151
(TEC-7200 ONLY)
CHARGE LED CONTROL IC116-2/4, IC110-4/4
ROM IC103
HALT CRT
CALDSP
D/A CONVERTER IC406, 114-2/2
D0~7
CRT CPU IC405
P23
P25
BA
BUFFER IC401~403
ADDRESS
DATA
RAM IC404
TIMING CONTROL IC410
Q3, Q5, Q8
Q8
BLANKING PULSE GENERATOR IC408, 409
VSYNC GENERATOR IC411, 412
YSIG
HSYNC BRIGHT etc
BLANK
VSYNC
TO CRT DRIVER
CRT
ECG 2
HALT ECG
RAM IC204
ECG CPU IC201
BUFFER IC205~207
ROM IC203
A/D CONVERTER IC202
CHGAD
ENRGADJ
TTR
FROM HV BD
12VB FROM POWER BD
PCAD
MAIN
ECG2
ECG1
LFAULT
SEL 0~2
50KHz
TCLK
SEL 3, 4
ECG
VIA ECG CABLE
DEFIB PROTECTOR R301~315
IC301 302
WILSON NETWORK RA301, 302
LEAD SELECTOR IC303~305
IC306
MODULATOR IC309
COMMON MODE FEEDBACK IC307-1/2
RECTIFIER D301, 302 C309, 310
±6V
LEADS OFF DETECTOR IC308
PHOTO COUPLER PC301 302
T301
T302
ISOLATED-1
LEAD/PADDLE DEMODULATOR IC230
SWITCHING Q230, 231
TEST WAVE Q251
REF 4V
CAL Q250
CAL
INPUT SELECTOR ECG/TEST IC250-1/2
IC254
IC255
BASELINE RESTORER IC257, 258
LOW CUT
INST
LOW CUT
TIME CONST SELECTOR INST IC253, 256
INPUT SELECTOR ECG/TEST AUX TELEW IC250-2/2
HUMFIL
ON/OFF CONTROL IC253
AC FILTER IC251
50/60Hz SELECTOR SW102
GAIN 0~2
GAIN SELECTOR IC252 254
HICUT OFFSET IC255
(0.5V/1mV)
4V
REF 4V IC255
IC254
EXT ECG (1V/1mV) TO EXT INSTRUMENT THROUGH VR AND CONNECTOR BD
IC255
ZB ECG (1V/1mV) TO TRANSMITTER THROUGH DIP SW BD
ECG
VIA PADDLES
DIFIB PROTECTOR R351~354
IC351
HICUT R360, 361 C353
MODULATOR IC352
T352
RECTIFIER D357, 358
SWITCHING Q240, 241
T351
T381
IC381-1/2
PADDLE CONTACT EXCITOR IC380
REF 4V
IC381-2/2
PCAD TO A/D CONV
TEC-7200 ONLY
ISOLATED-2
IC254
AUX
TELEW
FROM RECEIVER
FROM EXT INSTRUMENT

TEC-7300


PRTCLK, SIN, S18
ENB, REC
TO RECORDER
DISPSEL
FROM FRONT PAPEL
BELLOUT
TO SPEAKER
UP-7638 FRONT PANEL BD
PANEL KEY SWITCH SW750~753
SYNC, BATTERY LED LED750~753
LED DRIVER 1 IC751 Q750~753
LEVEL SHIFT IC750
CHARGE LED LED754
LED DRIVER 2 Q754~757
POWER ON LED LED756
+12V
DISP 0
LED RED/YEL/GR
CHG LED
PADL 1, 2
EX.CHG,EX.DSCHG
LED RED/YEL/GR
TO PADDLE
ENERGY SELECT SW SW752
E-SEL 0~3
POWER ON
UP-7737 ECG/CPU BD
S0~3
R0~3, CNTL
KEY/LED INTERFACE IC102
I/O PORT IC101
CNTL
CLAMP
E-SEL 0~3
CHGON, INTRLY, EXTRLY
DIP 0~7
POWER ON
FROM DIP SW
TO HV BD
TO POWER BD
RTC TO ECG CPU
RUNAWAY DETECTOR IC106-1/2
RTC
NMI
VOLTAGE MONITOR IC105
RESET
HOST CPU IC107
MODE SELECTOR SW100
SOUND CONTROL IC108, 114-1/2 115, 116-1/4
BUFFER IC112
REALTIME CLOCK IC151
(TEC-7200 ONLY)
CHARGE LED CONTROL IC116-2/4 IC110-4/4
ROM IC103
RAM IC120
HALT CRT
CALCSP
D/A CONVERTER IC406, 114-2/2
D0~7
CRT CPU IC405
BA
P23
P25
BUFFER IC401~403
ADDRESS
DATA
ROM IC413
RAM IC404
TIMING CONTROL IC410
Q3, Q5, Q8
Q6
BLANKING PULSE GENERATOR IC408, 409
VSYNC GENERATOR IC411, 412
YSIG
HSYNC
BRIGHT
etc
BLANK
VSYNC
TO CRT DRIVER
CRT
ECG 2
HALT ECG
ECG CPU IC201
RAM IC204
BUFFER IC205~207
ADDRESS
DATA
ROM IC203
BA
A/D CONVERTER IC202
PCAD
CLK, RxD, TxD TO PACING UNIT, INTERFACE UNIT
CHGAD
ENRGADJ
TTR
12VB
FROM HV BD
FROM POWER BD
MAIN
ECG 2
ECG OUT TO PACING UNIT
ECG 1
LFAULT
SEL 0~2
50KHz
50KHz
TCLK
TEST WAVE Q251
SEL 3,4 OPTION
LATCH IC212
HUMFIL
ISOLATED-1
ECG VIA ECG CABLE
DEFIB PROTECTOR R301~315
IC301 302
WILSON NETWORK RA301, 302
LEAD SELECTOR IC303~305
IC306
MODULATOR IC309
±6V
RECTIFIER D301, 302 C309, 310
50KHz
T301
T302
COMMON MODE FEEDBACK IC307-1/2
SEL 0~2
LEADS OFF DETECTOR IC308
PHOTO COUPLER PC301 302
LEAD/PADDLE DEMODULATOR IC230
50KHz
SWITCHING Q230, 231
REF 4V
CAL Q250
CAL
INST
LOW CUT TC 0.1
INPUT SELECTOR ECG/TEST IC380-3/3 IC250-1/2
IC254
IC255
BASELINE RESTORER IC257, 258
LOW CUT INST.
TIME CONST SELECTOR INST IC253, 256
SEL 3,4
INPUT SELECTOR ECG/TEST AUX TELEW IC250-2/2
ON/OFF CONTROL IC253
AC FILTER IC251
50/60Hz SELECTOR SW102
GAIN 0~2
GAIN SELECTOR IC252 254
HICUT OFFSET IC255
(0.5V/1mV)
4V
REF 4V IC255
IC254
IC255
EXT ECG (1V/1mV) TO EXT INSTRUMENT THROUGH VR AND CONNECTOR BD
ZB ECG (1V/1mV) TO TRANSMITTER THROUGH DIP SW BD
ISOLATED-2
ECG VIA PADDLES
DIFIB PROTECTOR R351~354
IC351
HICUT R360, 361 C353
MODULATOR IC352
T352
±6V
RECTIFIER D357, 358
T351
SWITCHING Q240, 241
T381
IC381-1/2
PADDLE CONTACT EXCITOR IC380
REF 4V
IC381-2/2
PCAD TO A/D CONV
OP ECGX5
IC254
AUX
TELEW
FROM INTERFACE UNIT THROUGH CRT BD
FROM EXT. INSTRUMENT
FROM RECEIVER

3-3 ECG/CPU Board UP-7635/76351/7737

ECG/CPU Board consists of four blocks : ECG amplifier, ECG CPU, host CPU and CRT CPU section. Front panel board UP-7638 is also described in the host CPU section.

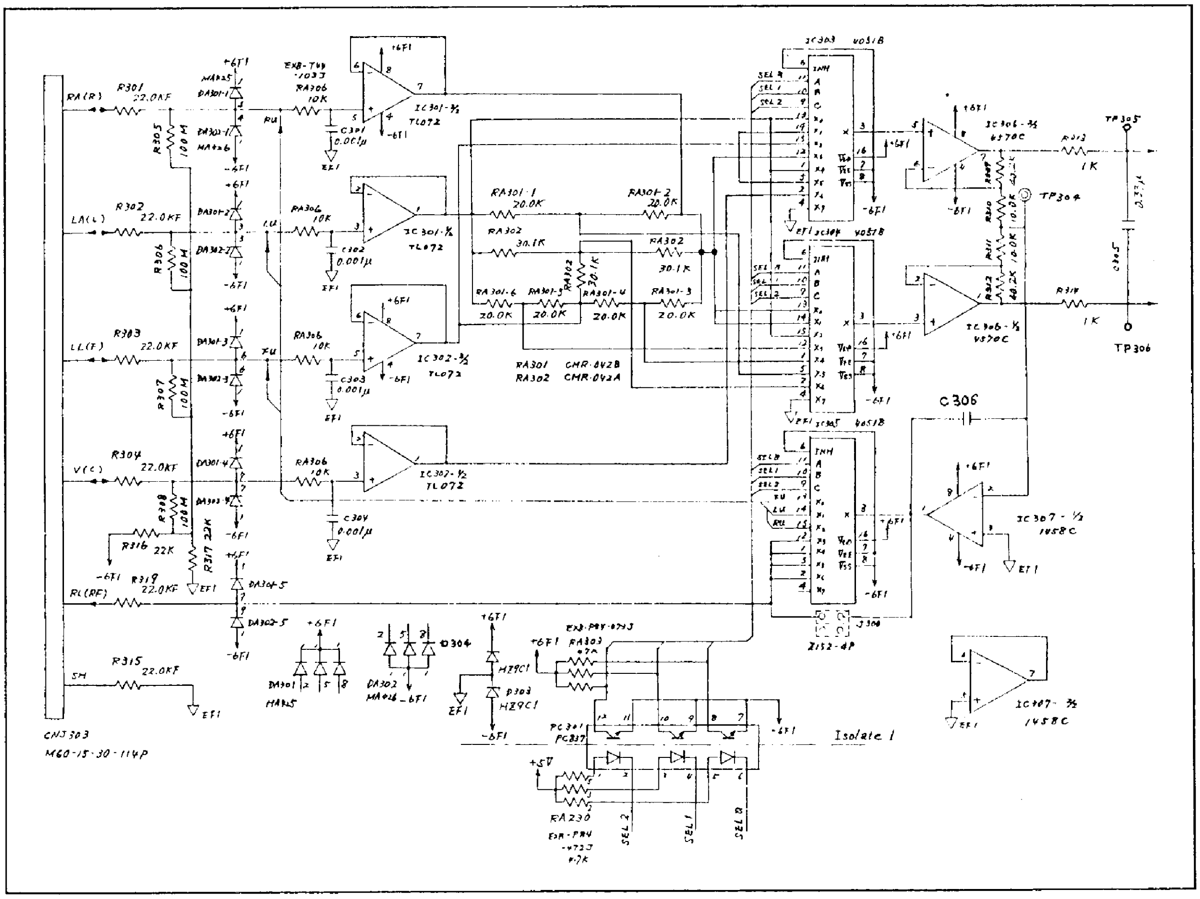
ROM Version Display

The version of ROMs on the ECG/CPU board can be displayed by following operations.

TEC-7100/7200: Turn on the power while pressing the ↑ key.
TEC-7300: Press both CAL and FREEZE key simultaneously.

3-3-1 ECG Amplifier

ECG Input and Lead Selection


RA(R)
R301 22.0KF
LA(L)
R302 22.0KF
LL(F)
R303 22.0KF
V(C)
R304 22.0KF
RL(RF)
R319 22.0KF
SH
R315 22.0KF
R305 100M
R306 100M
R307 100M
R308 100M
R316 22K
R317 22K
CNJ303
M60-15-30-114P
+6F1
-6F1
EF1
MA125
MA126
DA301-1
DA302-1
DA301-2
DA302-2
DA301-3
DA302-3
DA301-4
DA302-4
DA301-5
DA302-5
DA301
DA302
MA126
D304
RU
LU
FU
EXB-T44-103J
RA306 10K
C301 0.001μ
C302 0.001μ
C303 0.001μ
C304 0.001μ
IC301-½ TL072
IC302-½ TL072
RA301-1 20.0K
RA301-2 20.0K
RA301-3 20.0K
RA301-4 20.0K
RA301-5 20.0K
RA301-6 20.0K
RA302 30.1K
RA301 CMR-8V2B
RA302 CMR-0V2A
IC303 4051B
IC304 4051B
IC305 4051B
INH
A
B
C
SEL 0
SEL 1
SEL 2
IC306-½ 4570C
R309 43.2K
R310 10.0K
R311 10.0K
R312 40.2K
R313 1K
R314 1K
TP304
TP305
TP306
C305
C306
IC307-½ 1458C
J306
Z152-4P
HZ9C1
D303
EXB-P84-473J
RA303 47K
PC301
PC837
Isolate 1
+5V
RA230
EXB-P84-472J
4.7K

The ECG signals are selected as a lead and sent to the modulator. To improve CMRR, a common mode signal is fed back to the reference electrode.

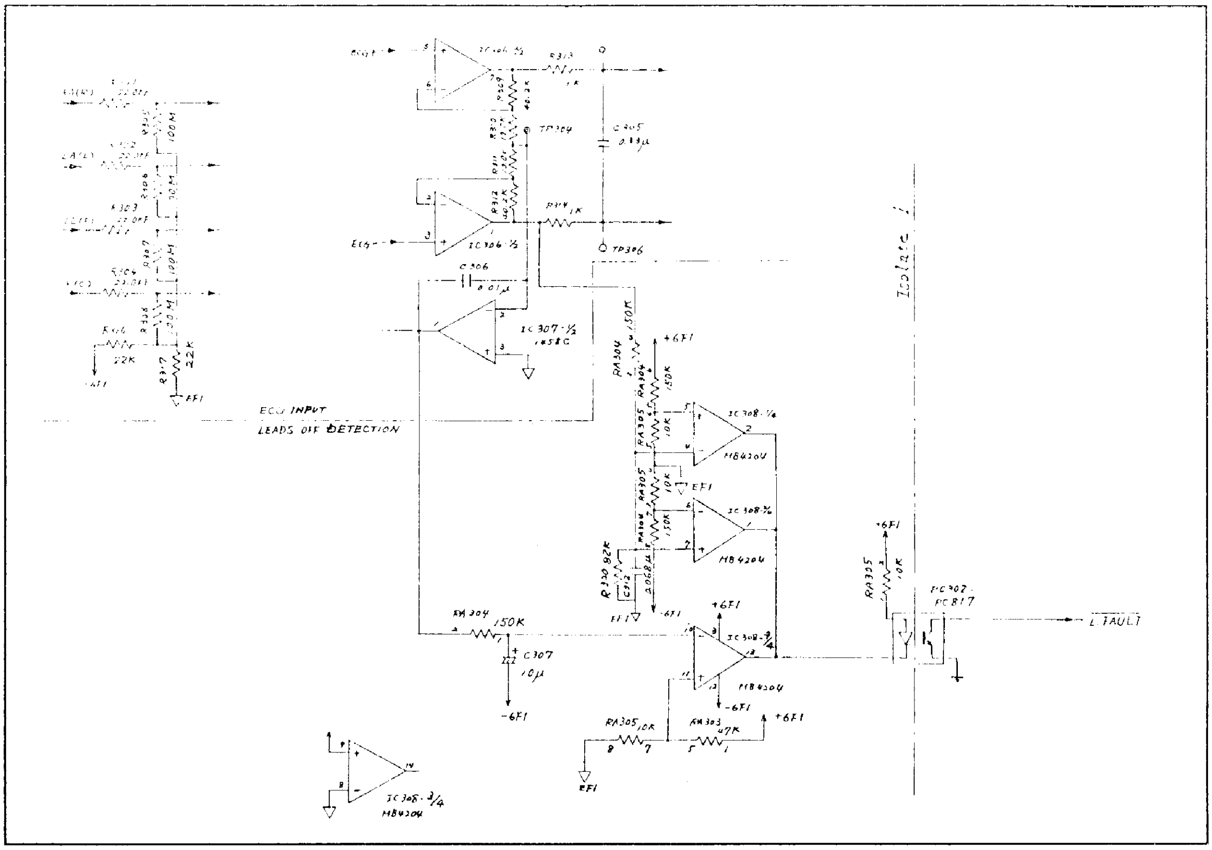
The ECG signals are sent to the buffer amplifier IC301~302. R301~304, RA306 and C301~304 compose the high-cut filter of 5KHz to eliminate high frequency noise. DA301~302 limit the excessive input voltage for circuit protection. R305~308, 316 and 317 reduce the input to – 3V when an electrode is detached for leads-off detection. The outputs of the Wilson network RA301 ~ 302 are selected by the multiplexer IC303~304. Control signals (+5V/0V) from the ECG CPU are isolated and converted to (+6V/–6V) by the photocoupler PC301. Relationship between control signals (SEL 0~2) and selected leads are as follows.

Lead Selection IC303 ~ 304

Control			Out			Lead
SEL0	SEL1	SEL2	X	IC303	IC304	
0	0	0	X0	LA (L)	RA (R)	I
0	0	1	X1	LL(F)	RA (R)	II
0	1	0	X2	LL(F)	LA (L)	III
0	1	1	X3	RA (R)	LL(F) & LA (L)	aVR
1	0	0	X4	LA (L)	LL(F) & RA(R)	aVL
1	0	1	X5	LL(F)	RA (R) & LA (L)	aVF
1	1	0	X6	V (C)	RA (R), LA (L) & LL(F)	V
1	1	1	X7	EF1	EF1	OFF (Paddle Lead)

Selected signals are amplified by IC306 with a gain of 5 (=(R310+R309) /R310=(R311+R312)/R311). R313~314 and C305 compose the high-cut filter of 240Hz. A common mode signal at TP304 is fed back to the reference electrode by the comparator IC307-1. See leads-off section for the selection of IC305. Even when excessive voltage is input and DA301~302 are turned on, the power supply voltage is maintained within ±9V by D303~304.

Leads-off Detection

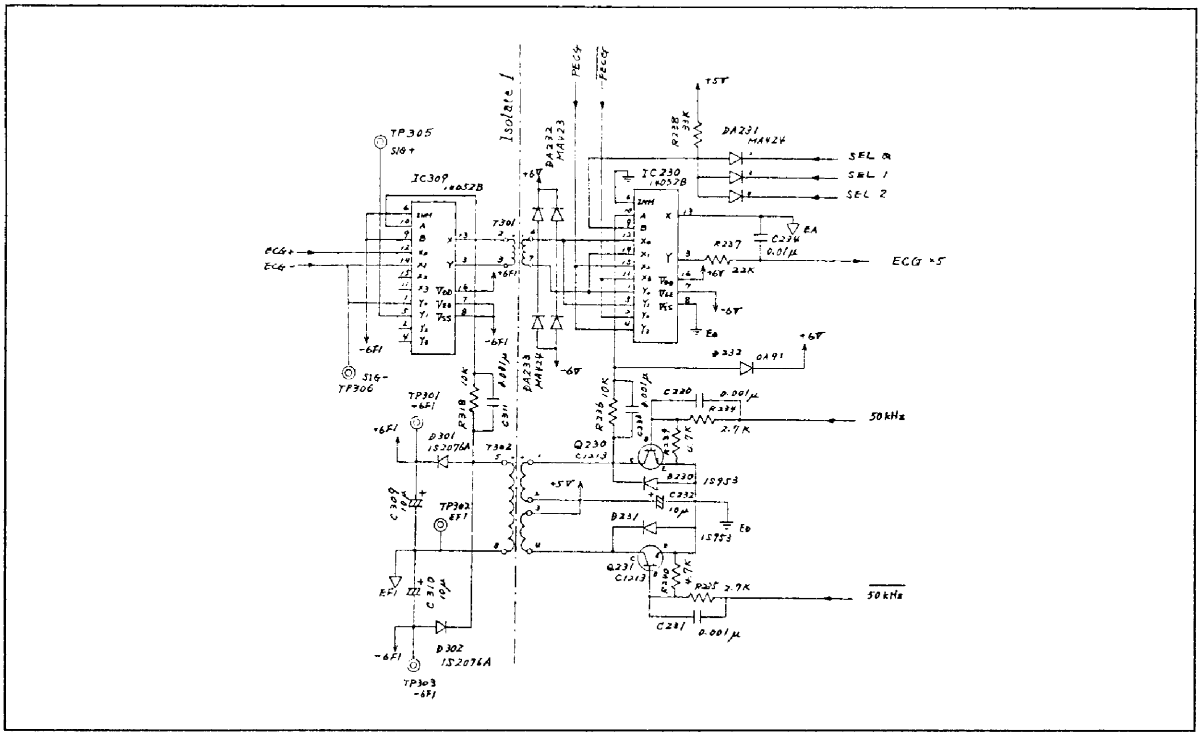

ECG+
IC306-½
R313
1K
R309
40.2K
TP304
C305
0.33μ
R310
R311
R312
40.2K
R314 1K
ECG-
IC306-½
TP306
C306
0.01μ
IC307-½
4558C
R305
100M
R306
10M
R303
R307
100M
R304
R308
10M
22K
R317
22K
EFI
ECG INPUT
LEADS OFF DETECTION
RA304
150K
+6FI
RA305
10K
IC308-¼
MB4204
EFI
IC308-¾
R320 82K
C312
0.068μ
-6FI
RA304
150K
C307
10μ
IC308-¾
RA305 10K
RA303
47K
IC308-¾
MB4204
RA305
10K
PC302
PC817
LFAULT

Although RA (R), LA (L), LL (F) and V (C) electrodes reduced down to −3V through R305~308 for leads-off detection, the comparator IC307-1 feeds back current to active electrodes through the reference electrode and patient body to cancel common mode signal with the offset of −3V at TP304. Therefore, normally −3V does not affect the ECG signal. When an electrode is detached, feedback is not balanced, the output greatly deviates and leads-off is detected. Details concerning the detached electrode are as follows.

When a reference electrode is detached, the potential of the active electrodes becomes −3V because of no feedback current, −3V appears at TP304, comparator IC307-1 becomes high, comparator IC308-4 becomes low and photocoupler PC817 outputs a low LFAULT signal.

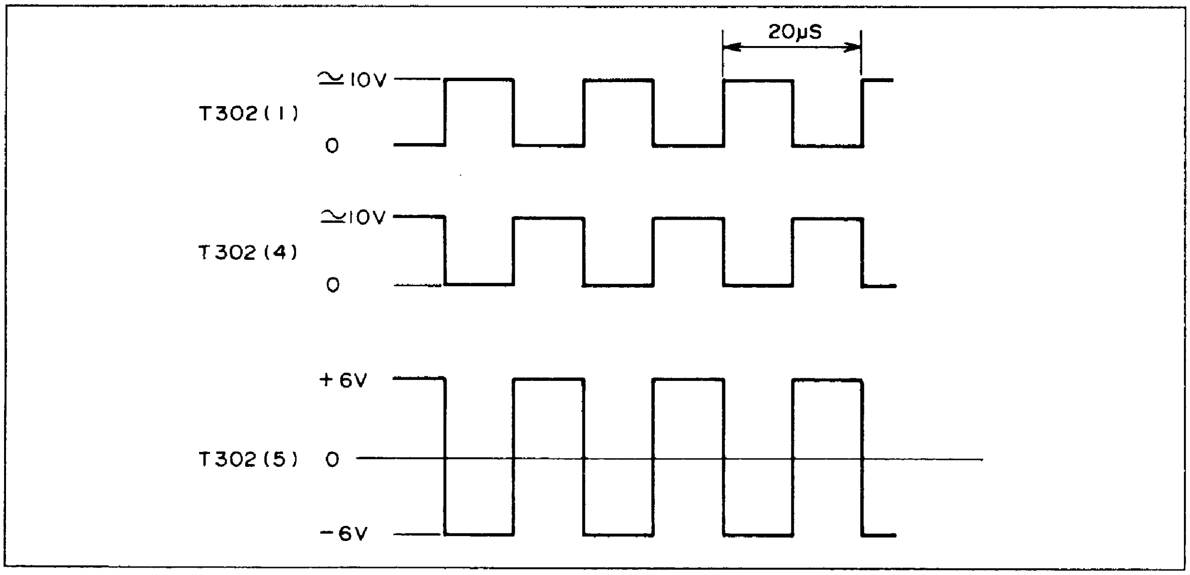
When an active electrode is detached, for example, in leads I~III, the potential of the detached electrode becomes −3V. IC307-1 feeds back current to the other active electrode to generate +3V. IC306 (1) saturates to positive or negative. Either comparator IC308-1 or IC308-2 becomes low (IC308 outputs are open collectors) and photocoupler PC817 outputs a low LFAULT signal.

ECG Isolation


TP305
SIG+
IC309
4052B
ECG+
ECG−
−6FI
SIG−
TP306
T301
+6FI
Isolate 1
PEC4
FEC4
DA232
MA423
DA233
MA424
+6V
−6V
+5V
R238
33K
DA231
MA424
SEL 0
SEL 1
SEL 2
IC230
4052B
EA
C234
0.01μ
R237
22K
ECG ×5
Ea
D233
OA91
50kHz
C230
0.001μ
R234
2.7K
R236
10K
Q230
C1213
D230
1S953
C232
10μ
Eb
D231
1S953
Q231
C1213
R235
2.7K
C231
0.001μ
50kHz
TP301
+6FI
R318
12K
C311
0.001μ
D301
1S2076A
T302
C309
TP302
EFI
C310
D302
1S2076A
TP303
−6FI

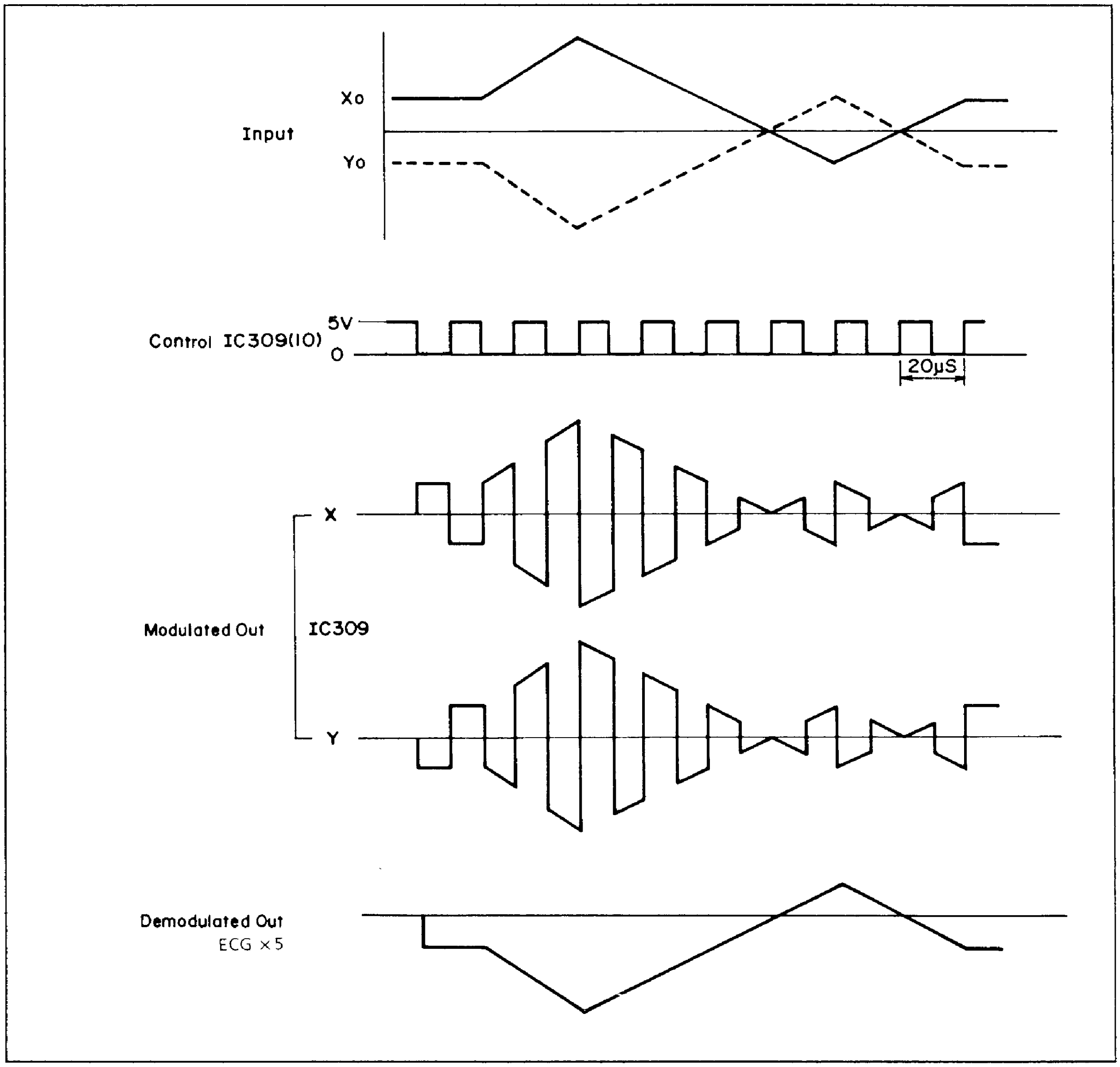
Q230~231 controlled by 50kHz clock from the ECG CPU, switch +5V for the primary winding of the isolation transformer T302. At the secondary winding of T302, the positive and negative cycle are half-wave rectified, respectively, to provide ± 6V floating power supply.

ECG Isolation Transformer Switching

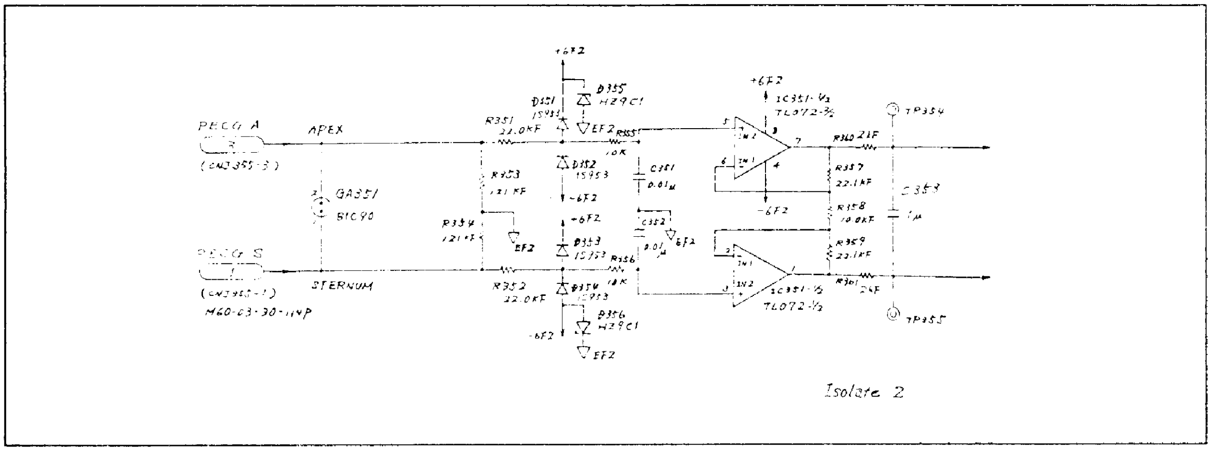


ECG Modulation / Demodulation

The output of T302 controls the multiplexer IC309 to modulate the ECG waveform. The modulated ECG waveform is transferred through T301 and demodulated by IC230. DA232~233 limit the T301 output voltage to approximately the power voltage. IC230 selects either standard lead ECG or paddle lead ECG controlled by SEL0~2.

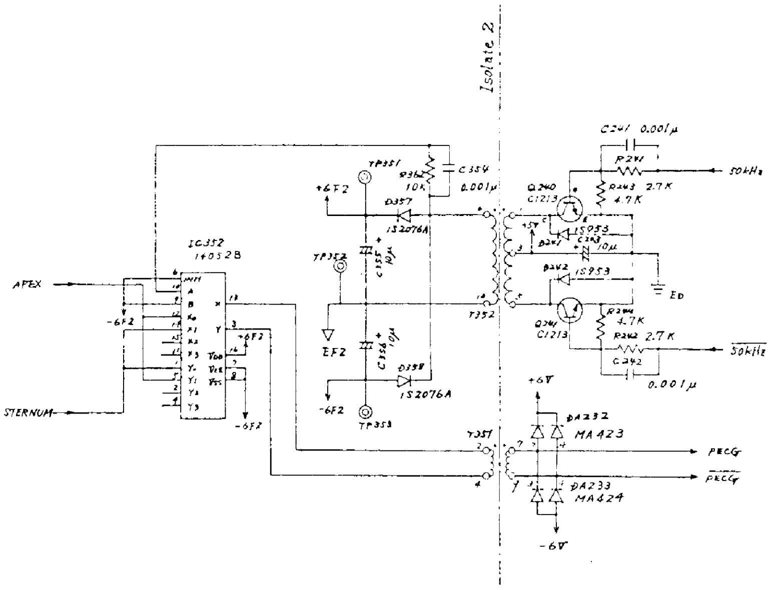

Input
Xo
Yo
Control IC309(10)
5V
0
20μS
X
Modulated Out
IC309
Y
Demodulated Out
ECG ×5

Paddle Lead ECG Input

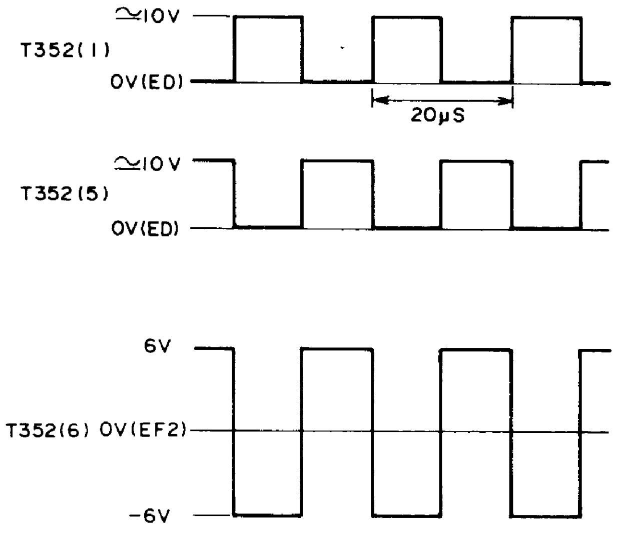

+6F2
D355
HZ9C1
D351
1S953
R351
22.0KF
EF2
R355
10K
PECG A
APEX
(CNJ355-3)
D352
1S953
C351
0.01μ
R353
121KF
GA351
BIC90
-6F2
+6F2
C352
R354
121KF
EF2
D353
1S953
0.01μ
EF2
R356
10K
PECG S
STERNUM
(CNJ355-1)
M60-03-30-11VP
R352
22.0KF
D354
1S953
D356
HZ9C1
-6F2
EF2
+6F2
IC351-½
TL072-½
IN2
IN1
R360 21F
R357
22.1KF
-6F2
R358
10.0KF
R359
22.1KF
IN1
IN2
IC351-½
TL072-½
R361 21F
TP354
C353
1μ
TP355
Isolate 2

Paddle lead ECG is input through the external discharge relay RLY550 to CNJ355. Input impedance is 242kΩ determined by R353~354. The high-cut filter of 497Hz is composed of R351, R355, C351, R352, R356 and C352 to eliminate high frequency noise. The gain of IC351 is 5.4 (=(R357+R359)/R358+1). The high-cut filter of 40Hz is composed of R360, R361, and C353. Even when excessive voltage is input and D351~354 are turned on, the power supply voltage is maintained within ±9V by D355~356. R351~352 limit current for excessive input to protect D351~354.

Paddle Lead ECG Isolation

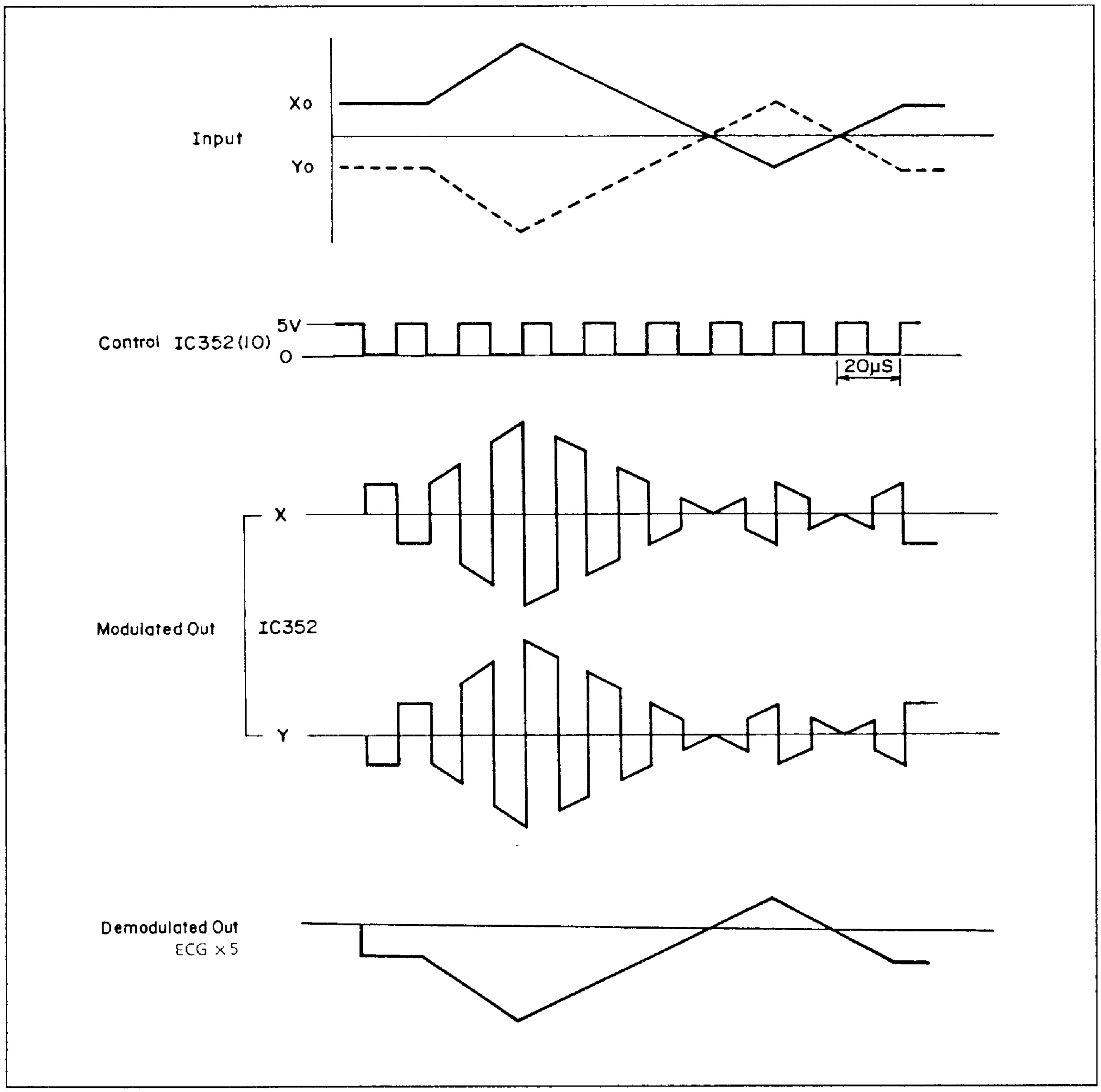

Isolate 2
C241 0.001μ
R241
50kHz
R243 2.7K
4.7K
Q240
C1213
1S953
C243
10μ
D241
+5V
D242
1S953
ED
Q241
C1213
R244
4.7K
R242 2.7K
50kHz
C242
0.001μ
T352
TP351
R362
10K
C354
0.001μ
+6F2
D357
1S2076A
TP352
C355
10μ
EF2
C356
10μ
D358
1S2076A
-6F2
TP353
IC352
14052B
APEX
-6F2
STERNUM
INH
A
B
X0
X1
X2
X3
Y0
Y1
Y2
Y3
X
Y
VDD
VEE
VSS
+6F2
-6F2
+6V
DA232
MA423
T351
PECG
PECG
DA233
MA424
-6V

Q240~241 switches +5V controlled by 50kHz clock from the ECG CPU for the primary winding of the isolation transformer T352. At the secondary winding of T352, the positive and negative cycle are half-wave rectified, respectively, to provide ±6V floating power supply.

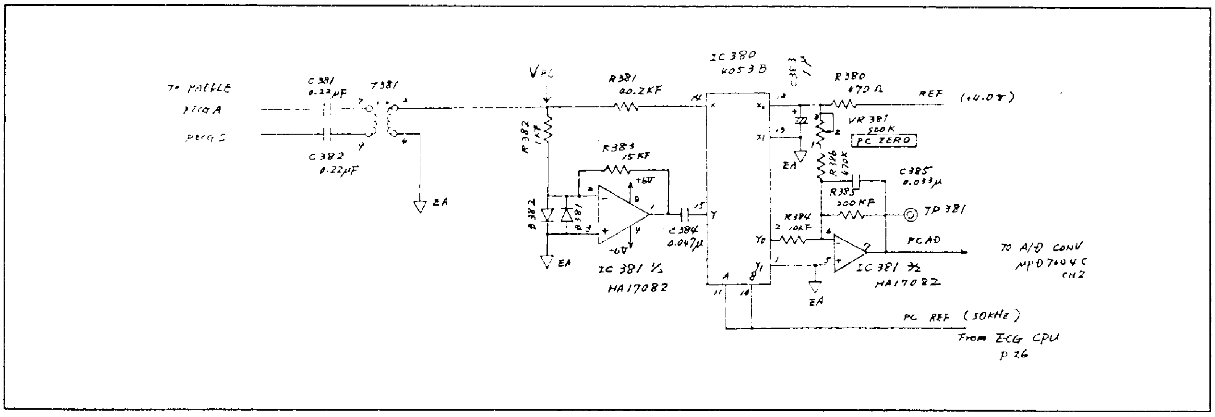


ECG Modulation / Demodulation

The output of T352 controls the multiplexer IC352 to modulate the ECG waveform. The modulated ECG waveform is transferred through T351 and demodulated by IC230. DA232~233 limit the T351 output voltage to approximately the power voltage. IC230 selects either standard lead ECG or paddle lead ECG controlled by SEL0~2.


Input
Xo
Yo
Control IC352 (IO)
5V
0
20μS
X
Modulated Out
IC352
Y
Demodulated Out
ECG × 5

Paddle Contact Impedance Detection (TEC-7200/7300)


TO PADDLE
ECG A
ECG B
C381
0.22μF
C382
0.22μF
T381
EA
VPC
R381
20.2KF
R382
1KF
R383
15KF
D382
D381
+6V
-6V
C384
0.047μ
IC381 ½
HA17082
IC380
4053B
C383
1μ
R380
470 Ω
REF (+4.0V)
VR381
500K
PC ZERO
R386
470K
C385
0.033μ
R385
200KF
TP381
R384
10KF
PCAD
IC381 2/2
HA17082
TO A/D CONV
μPD7004C
CH2
PC REF (50kHz)
From ECG CPU
p 26

Applying a square waveform of 50kHz to the paddle, the paddle contact impedance is detected by measuring the current. The paddle circuit is isolated from the excitor / detector circuit by T381 for safety.

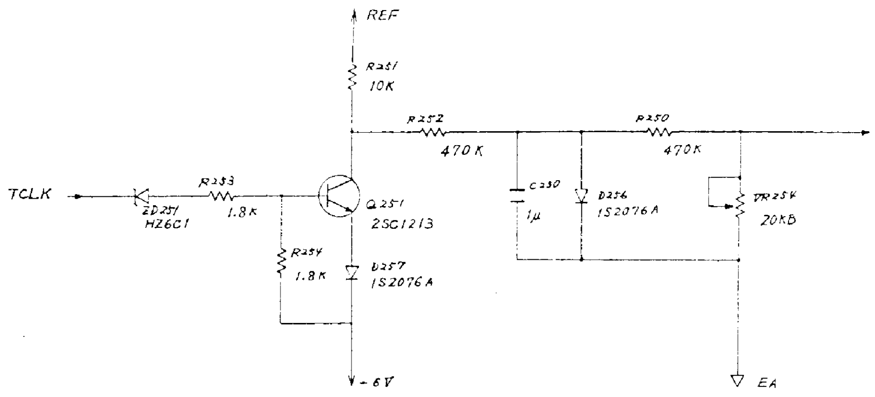
A reference voltage of 4.0V supplied by IC255-1 is switched by multiplexer IC380 to provide the square waveform at X (14). The voltage of the square signal is divided by R381 and the impedance Z. Detected voltage Vpc sent to IC381-1 with a gain of 15 times is expressed :

$$Vpc = 4.0 \times Z/(R381 + Z)$$

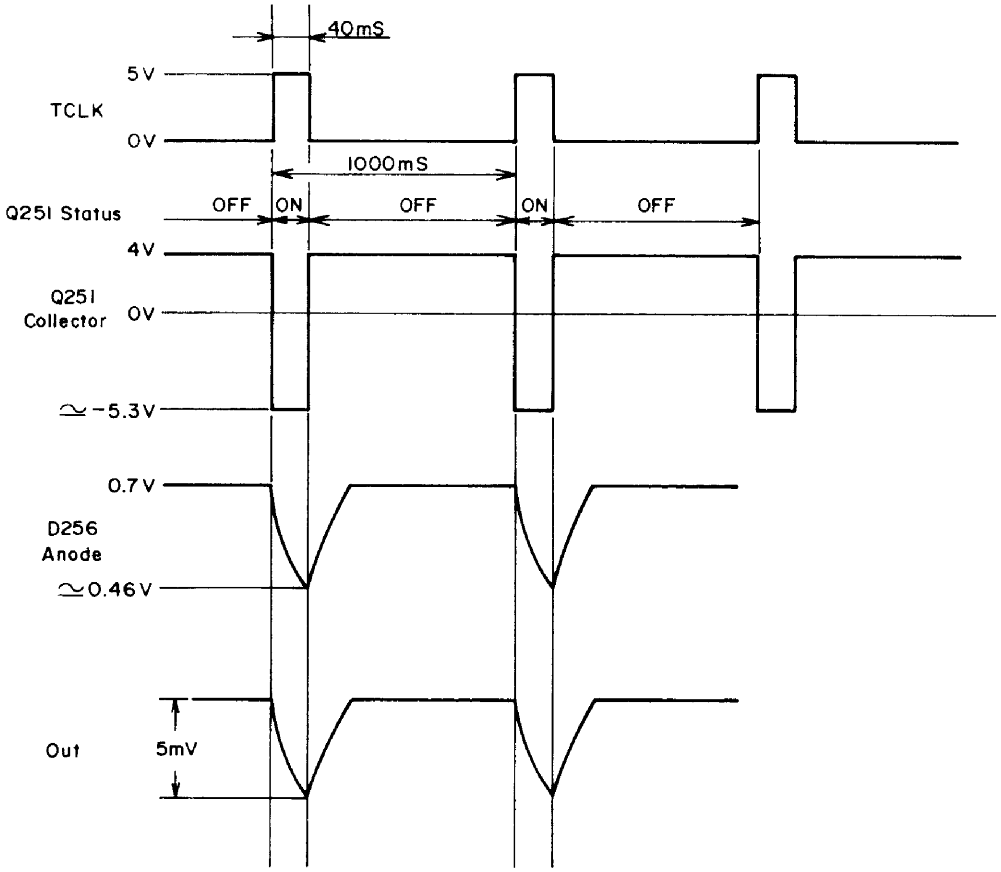
where Z : Impedance of paddle contact, T381, C381~382

D381~382 protects IC381-1 from an excessive voltage caused by turning on of the external discharge relay when discharged without load. C384 cuts offset voltage. Offset voltage is added to IC381-2 through VR381 and R386 to obtain only paddle contact impedance from Z. IC381-2 smoothes the input and sends it to the A/D converter IC202. Paddle contact indicators on the paddle light in accordance with this value.

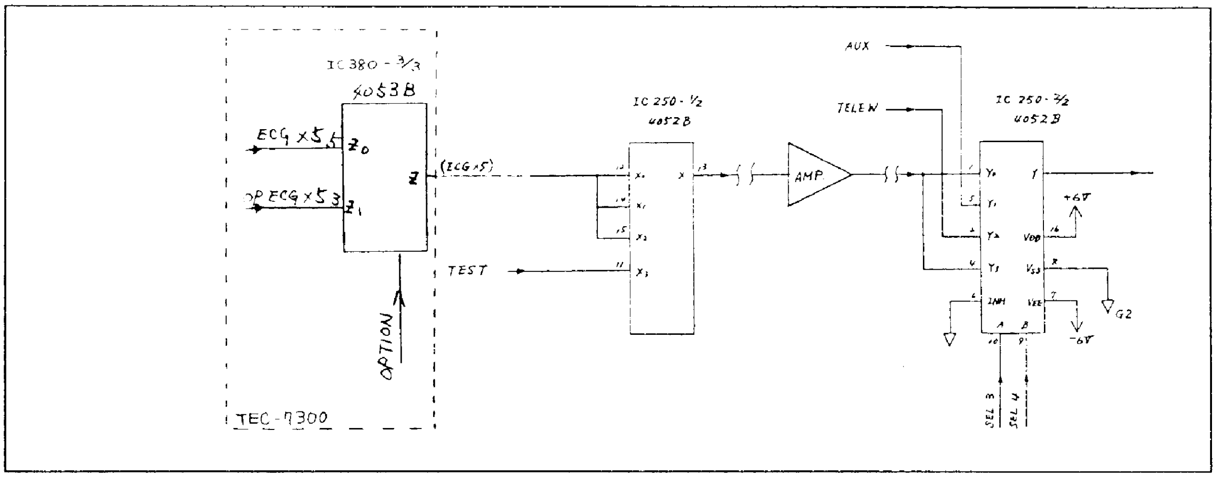
Test Waveform Generator


REF
R251
10K
R252
470K
R250
470K
TCLK
R253
1.8K
ZD251
HZ6C1
Q251
2SC1213
C250
1μ
D256
1S2076A
VR254
20KB
R254
1.8K
D257
1S2076A
-6V
EA

Charge and discharge of C250 controlled by TCLK generates the ECG simulated test waveform. The output voltage is adjusted to 5mVp-p with VR254.



Input Selector

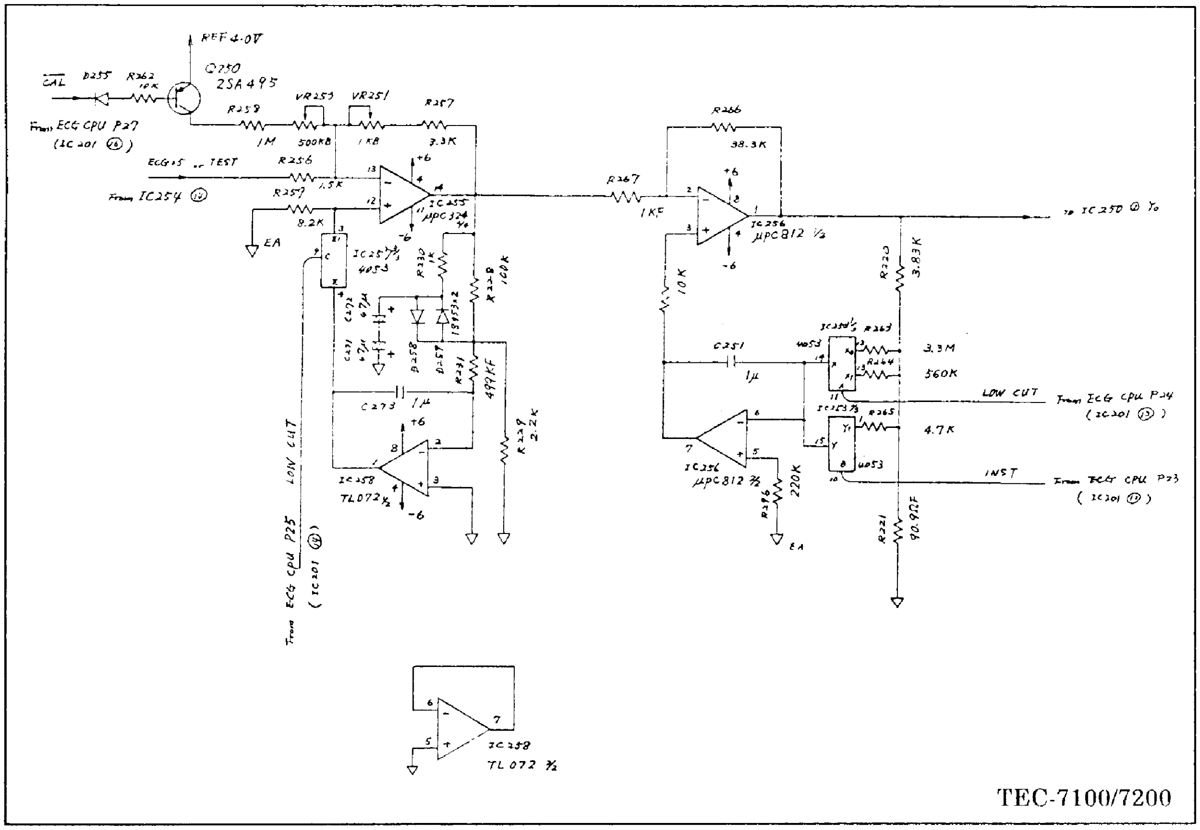

IC380 - 3/3
4053B
ECG x5
OP ECG x5
Z0
Z1
Z
OPTION
TEC-7300
(ECG x5)
TEST
IC 250 - 1/2
4052B
X0
X1
X2
X3
X
AMP
AUX
TELEW
IC 250 - 2/2
4052B
Y0
Y1
Y2
Y3
Y
INH
VDD
VSS
VEE
A
B
+6V
-6V
G2
SEL 3
SEL 4

IC250-1 selects the ECG or test waveform and IC250-2 selects one from ECG/test, auxiliary and telemeter input. The circuit between the two input selectors is described later. The relationship between control signals and outputs is shown below.

Input Selection IC250

Select	Z	Select		X	Y	Output
OPTION		SEL3	SEL4			
0	Z0	0	0	X0	Y0	ECG
0	Z0	0	1	X2	Y2	TELE
0	Z0	1	0	X1	Y1	AUX
0	Z0	1	1	X3	Y3	TEST
1	Z1	0	0	X0	Y0	OPTION

Baseline Restorer, Time Constant and INST Control


REF 4.0V
Q250
2SA495
CAL
D255
R262
10K
From ECG CPU P27
(IC201 ⑯)
R258
1M
VR253
500KB
VR251
1KB
R257
3.3K
ECG×5 or TEST
R256
1.5K
From IC254 ⑭
R257
8.2K
EA
+6
-6
IC255
μPC324 ¼
IC257⅓
4053
R230
1K
R228
100K
C272
47μ
C271
47μ
D258
D257
1S1553×2
R231
499KF
C273
1μ
R229
2.2K
IC258
TL072½
From ECG CPU P25
(IC201 ⑭)
LOW CUT
R267
1KF
R266
38.3K
IC256
μPC812 ½
10K
to IC250 ① Y0
R220
3.83K
IC253⅓
R263
3.3M
R264
560K
C251
1μ
4053
LOW CUT
From ECG CPU P24
(IC201 ⑬)
IC253⅓
R265
4.7K
IC256
μPC812 ½
R296
220K
INST
From ECG CPU P23
(IC201 ⑫)
R221
90.9ΩF
IC258
TL072 ½
TEC-7100/7200

Time constant selection of 0.32 and 3.2 sec. is controlled by two blocks : IC255-4, 258-1 and IC256. Both blocks are controlled by LOWCUT. Main function of IC255-4 and 258-1 is baseline restoring when energy is discharged. 3.2 sec. is selected only when the DIP switch on the side panel is set to the ECG position and the energy selector is set to the ECG/MON position. LOWCUT from the ECG CPU is high when 0.32 sec. is selected.

Baseline Restoring

This circuit quickly restores the saturated baseline due to a large polarization voltage caused by energy discharge. This circuit operates when a time constant of 0.32 sec. is selected (low level of LOWCUT turns on switch IC257-3). When the energy is discharged, the output of IC255-4 becomes much greater than usual, D258 or D259 turns on, and the gain of the high-cut filter IC258 becomes 30 times greater than usual as the output of IC255-4 is divided by R230 and R229. IC258-1 provides a large feedback to the amplifier IC255-4 to restore the baseline quickly. C271~272 do not allow a narrow pulse such as a pacing pulse to turn on D258~259.

Time Constant Selection

(1) Time constant of 3.2 sec.

As low level of LOWCUT turns off IC257-3 to disconnect the feedback amplifier IC258-1, IC255-4 functions only as an inverting amplifier. The output of IC256-1 is sent to the high-cut filter IC256-2 through R263 to feedback low frequency components.

(2) Time constant of 0.32 sec.

As a high level of LOWCUT turns on IC257-3, the time constant is determined by both blocks. Usually the output of the IC255-4 is several mV to several tens mV. As this level does not turn on D258~259, the input divided by R228 and R229 is sent to IC258-1. R230, D258~259 and C271~272 do not function. The output of IC256-1 is sent to the high-cut filter IC256-2 through R264.

INST Control

When the INST from the ECG CPU becomes high, switch IC253-2 turns on and R265 is selected to permit an extremely short time constant to reset the baseline. In the TEC-7300, switch IC257-2/3 also turns on to reset the baseline for the time constant control circuit of the previous stage.

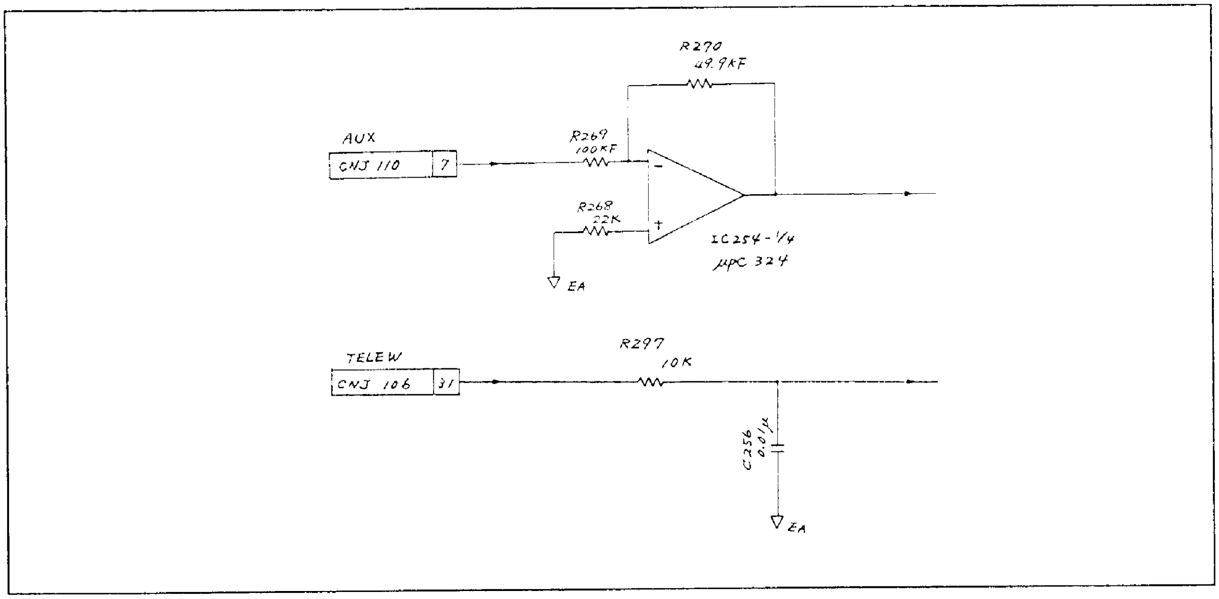
Calibration Waveform Superimpose

When the CAL from the ECG CPU becomes low, Q250 turns on to add the calibration to IC255-4.

Total Gain

The total gain of these circuits is adjusted with VR251 to 100 (=(R257 + VR251) /R256 × R266/R267).

External Inputs


R270
49.9KF
AUX
CNJ 110
7
R269
100KF
R268
22K
IC254-1/4
μPC 324
EA
TELEW
CNJ 106
31
R297
10K
C256
0.01μ
EA

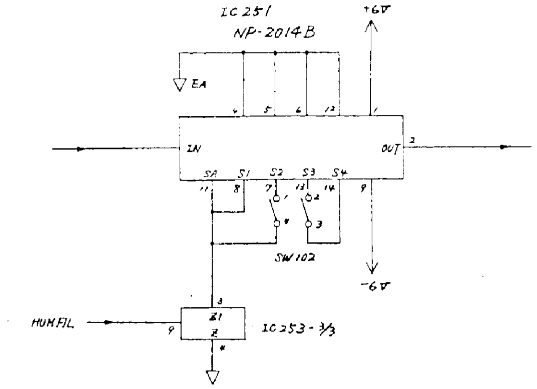
AUX

Auxiliary input of 1Vp-p is output as 1Vp-p at a sensitivity of × 1. The gain of IC254 is 0.5.

TELEW

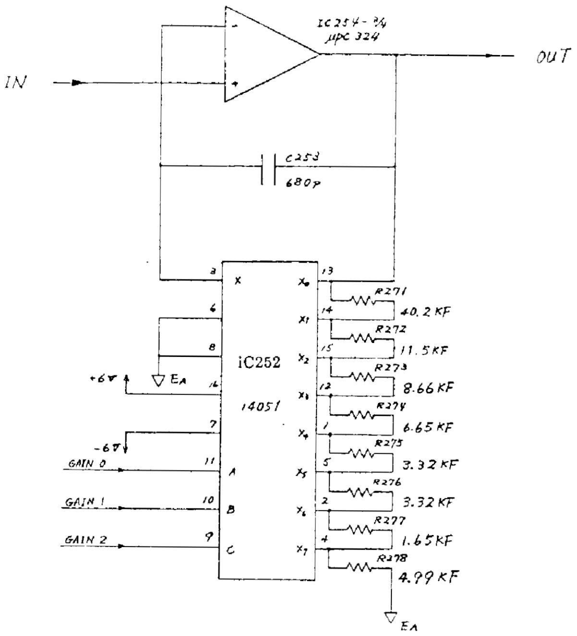
When the receiver is connected, the telemetry signal of inverted ECG of 0.5V/1mV appears as TELEW. The high-cut filter of 1.6kHz consists of R297 and C256.

AC Filter


IC251
NP-2014B
+6V
EA
4
5
6
12
1
IN
OUT
2
SA
S1
S2
S3
S4
11
8
7
13
14
9
1
2
4
3
SW102
-6V
HUMFIL
3
Z1
Z
9
4
IC253-3/3

High level of HUMFIL turns on AC filter IC251. SW102 selects the frequency (ON: 60Hz, OFF: 50Hz).

Sensitivity Selection

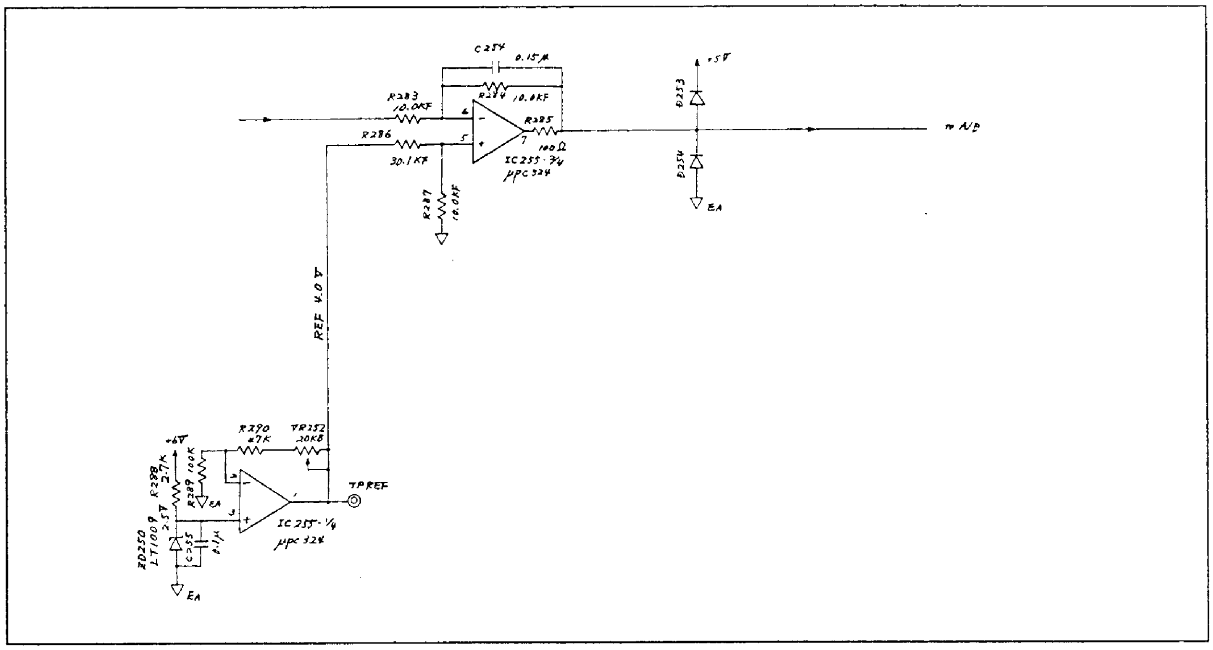

IN
IC254-¾
μpc 324
OUT
C253
680p
iC252
14051
3
6
8
16
7
11
10
9
X
A
B
C
+6V
EA
-6V
GAIN 0
GAIN 1
GAIN 2
X0
X1
X2
X3
X4
X5
X6
X7
13
14
15
12
1
5
2
4
R271
40.2 KF
R272
11.5 KF
R273
8.66 KF
R274
6.65 KF
R275
3.32 KF
R276
3.32 KF
R277
1.65 KF
R278
4.99 KF
EA

Sensitivity is selected by the multiplexer IC252. The input level of the selector is 0.125V/mV. Manual (×0.5, ×1, ×2, ×4) and auto selection are available.

Sensitivity Selection IC252

Total Gain (V/mV)		Control			Selection	Output Sensitivity (V/mV)
Auto	Manual	GAIN 0	GAIN 1	GAIN 2		
----	----	0	0	0	X0	Not used
0.5	0.5	0	0	1	X1	0.25
0.7	----	0	1	0	X2	0.35
1	1	0	1	1	X3	0.50
1.5	----	1	0	0	X4	0.75
2	2	1	0	1	X5	1.0
3	----	1	1	0	X6	1.5
4	4	1	1	1	X7	2.0

ECG Analog Output


C254
0.15μ
R283
10.0KF
R284 10.0KF
R285
100Ω
6
5
7
R286
30.1KF
IC255-3/4
μPC324
R287
10.0KF
+5V
D253
D254
EA
to A/D
REF 4.0V
R290
47K
VR252
20KB
+6V
R288
2.7K
R289 100K
EA
2
3
1
TPREF
IC255-1/4
μPC324
2.5V
ZD250
LT1009
C255
0.1μ
EA

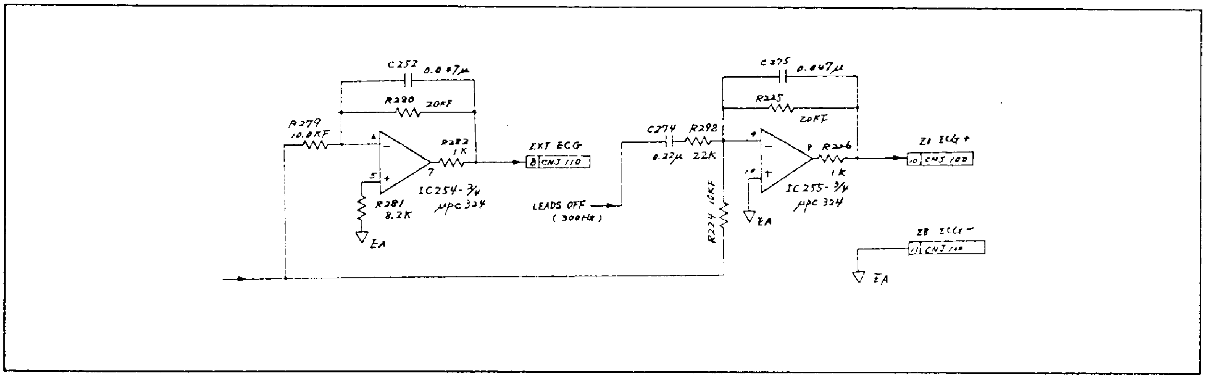
Reference Generator

IC255-1 supplies a regulated reference voltage of 4.0V. 2.5V of ZD250 is amplified by a factor of 1.6 to provide 4.0V.

High-cut Filter with Offset

IC255-2 is the high-cut filter of 100Hz with a gain of 1. The reference voltage of 4V is divided into 2V and added to IC255-2 as offset. This offset shifts the ECG signal range of −2V ~ +2V to an A/D conversion range of 0 ~ +4V.

External Outputs


C252 0.047μ
R280 20KF
R279 10.0KF
R282 1K
7
5
R281 8.2K
EA
IC254-3/4 μPC324
EXT ECG
8 CNJ 110
LEADS OFF
(300Hz)
C274 R298
0.22μ 22K
R224 10KF
C275 0.047μ
R225 20KF
R226 1K
EA
IC255-3/4 μPC324
Z1 ECG+
10 CNJ 100
ZB ECG−
11 CNJ 100
EA

External Output

IC254-2 is the high-cut filter of 170Hz with a gain of 2. The output level is 1V/1mV.

Telemeter Output

ZBECG signal is sent to the transmitter through the cable with attenuator for the central monitor. IC255-3 is the high-cut filter of 170Hz with a gain of 2. The output level is 1V/1mV. When leads-off is detected, a square waveform of 300Hz sent from the CRT CPU is added to IC255-3 through C274 to cut the DC component.

The ZB ECG signal attenuated to 1/1000 in the DIP SW board is outputted at the sensitivity of 1mV/1mV.

3-3-2 ECG CPU

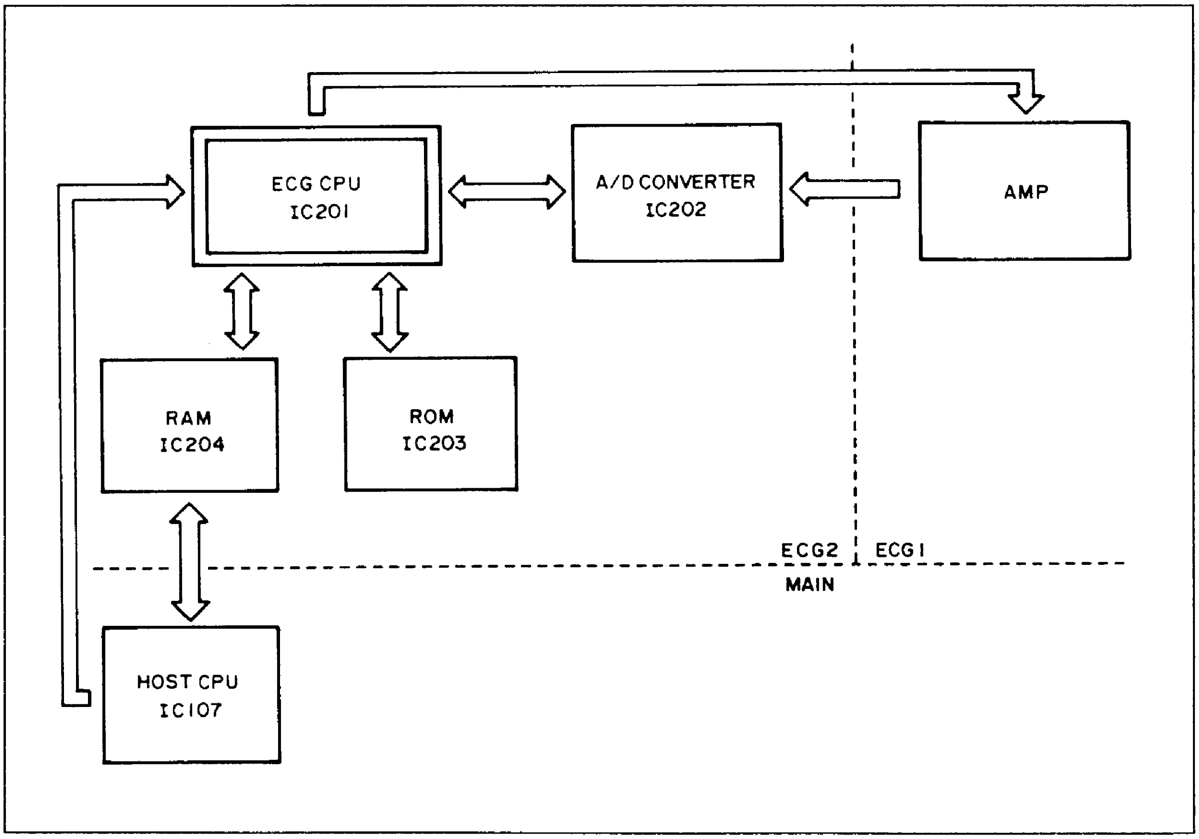
Outline

The ECG CPU section controls :

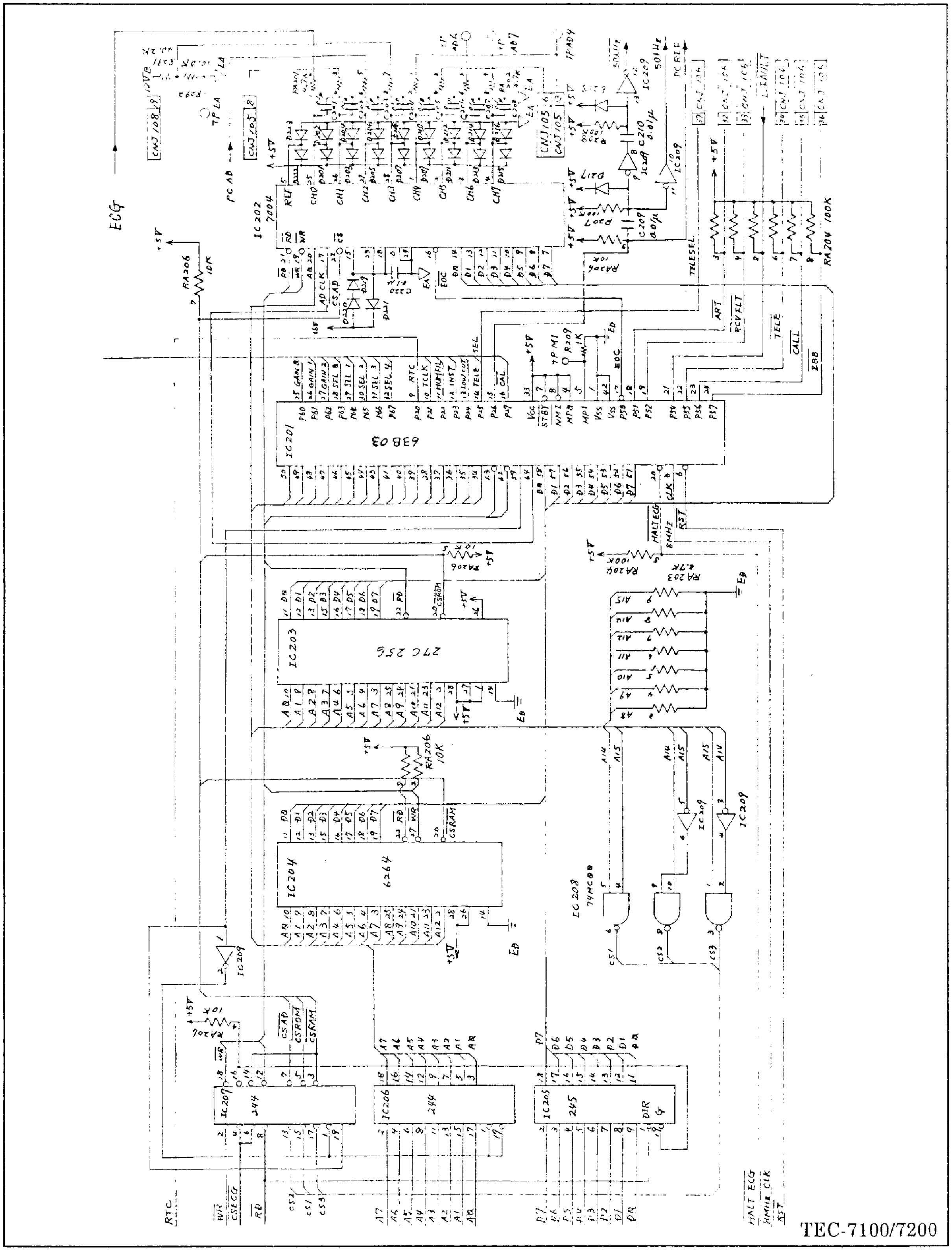
- ECG amplfier
- Data transfer to / from the host CPU through the ECG CPU RAM
- A/D conversion of the waveform, charge voltage, discharged energy, battery voltage, etc.
- QRS detection
- Heart rate count
- VPC detection (TEC-7300 only)
- Communication with the pacing unit or interface unit (TEC-7300 only)

The ECG CPU operates on a 2MHz system clock (3MHz in TEC-7300) according to the program in the external ROM. The host CPU halts the CRT ECG every 2 msec. to transfer the data. After the data is transferred, the ECG CPU starts processing A/D converted data and the main routine.

ECG CPU and Peripheral Blocks


ECG CPU
IC201
A/D CONVERTER
IC202
AMP
RAM
IC204
ROM
IC203
ECG2
ECG1
MAIN
HOST CPU
IC107

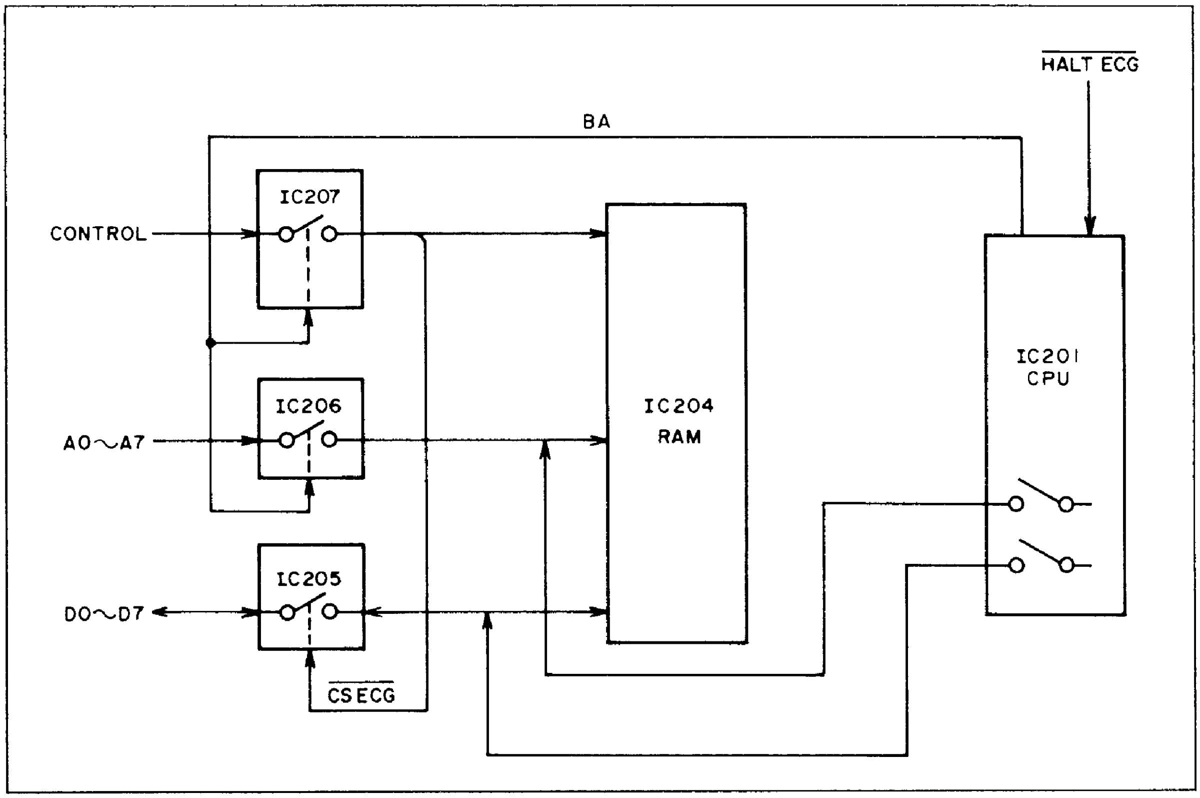
ECG CPU


ECG
IC201
63B03
IC202
7004
IC203
27C256
IC204
6264
IC205
245
IC206
244
IC207
244
IC208
74HC00
IC209
RA206 10K
RA204 100K
RA203 4.7K
R207
R209 1K
C209 0.01μ
C210 0.01μ
TP AD
TP ADG
TP MI
TP LA
CNJ105
CNJ108
PC AD
TELESEL
ART
RCV FLT
TELE
CALL
EBB
HALT ECG
8MHZ
RST
CSAD
CSROM
CSRAM
CS1
CS2
CS3
RTC
WR
CSECG
RD
+5V
ED
TEC-7100/7200

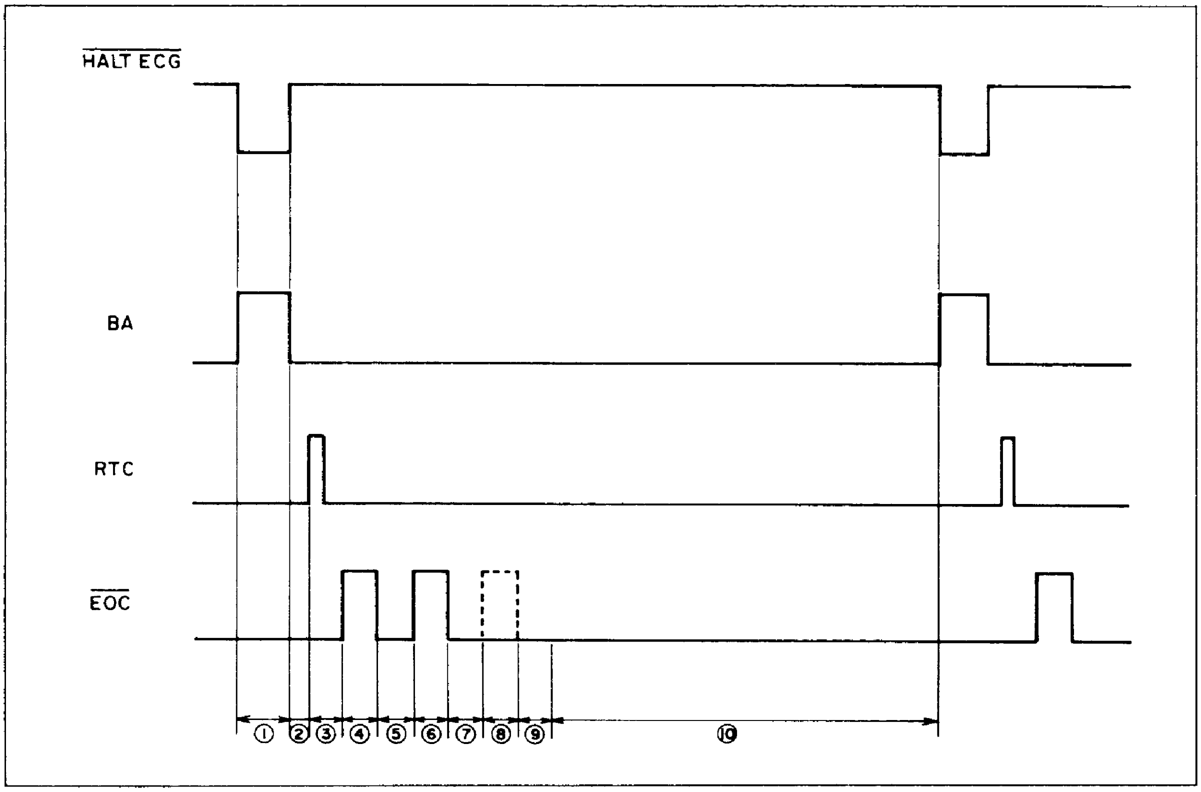
Communication with the Host CPU

Every 2 msec. the host CPU halts the ECG CPU IC201 and transfers the data to / from the ECG CPU RAM IC204. When HALTECG becomes low, the ECG CPU disconnects the bus line from itself and BA (bus available) becomes high to turn on the three-state buffer IC206~207 for the control and address bus. When the host CPU accesses the ECG RAM, CSECG becomes low to turn on the bi-directional three-state buffer IC205 for the data bus and to enable IC204 to access data. RD controls the transfer direction of the buffer.

ECG CPU Data Bus Control


HALT ECG
BA
IC207
CONTROL
IC201
CPU
IC206
IC204
RAM
A0~A7
IC205
D0~D7
CS ECG

Processing Cycle



RTC is an interrupt signal from the host CPU. During A/D conversion, the A/D converter IC202 outputs high EOC (End Of Conversion). The ECG CPU processing is shown below.

① Data is transferred from / to the host CPU to / from the ECG RAM
② Return to main routine executed before HALTECG interrupt
③ Processing for time constant, etc.
④ A/D conversion for the ECG waveform
⑤ QRS detection routine, etc.
⑥ A/D conversion for one of the following inputs :
  CH1: Charged voltage
  CH2: Paddle contact impedance
  CH3: Battery voltage
  CH4: Reference for discharged energy calculation
  Above inputs are changed every RTC in the sequence of CH1→CH2→CH1→CH3→CH1→CH2→CH1→CH4.
⑦ Processing for A/D converted data of ⑥
⑧ Main routine, or A/D conversion for TTR after CH4 is converted only when the energy is discharged.
⑨ Main routine, or calculation of discharged energy when TTR is converted.
⑩ Main routine

ECG CPU Pin Description

Pin No.	Symbol	I / O	Function
1	Vss	---	Ground (ED)
2	XTAL	---	Not used
3	EXTAL	I	Clock 8 MHz (TEC-7100/7200), 12MHz (TEC-7300)
4~5	MP0~MP1	I	Operation mode selection — Mode 1 (MP0 : 1, MP1 : 0)
6	RST	I	Reset — 0 : Resets the CPU when the power is turned on.
7	STBY	I	Not used
8	NMI	I	Not used
9	P20	I	RTC — Clock pulse of 2 msec. from the host CPU
10	P21	O	TCLK (Test clock) — Clock pulse of 100 msec. for the test waveform (See Test waveform generator section.)
11	P22	O	(TEC-7100/7200) HUMFIL (AC filter) — 1 : ON (TEC-7300) Serial communication clock
12	P23	O	(TEC-7100/7200) INST (Instantaneous trace reset) — 1 : ON (TEC-7300) Reception data of serial communication
13	P24	O	(TEC-7100/7200) LOWCUT (Time constant select) — 0 : 3.2 sec (Diagnosis), 1 : 0.32 sec (Monitor) (TEC-7300) Transmission data of serial communication
14	P25	O	(TEC-7100/7200) LOWCUT (Time constant select and ECG restorer) — 0 : 3.2 sec, restorer OFF, 1 : 0.32 sec, restorer ON (TEC-7300) Not used
15	P26	O	ECGCLK (ECG clock) — Modulation pulse of 50 kHz for ECG isolation.
16	P27	O	(TEC-7100/7200) CAL — 0 : Calibration appears. (TEC-7300) OPTION — 1 : ECG waveform is input from interface unit
17	P50	I	EOC (End of conversion) — 1 : During A / D conversion, 0 : End of A / D conversion
18	P51	I	ART (Artifact) — 0 : The electrode of a transmitter is detached.
19	P52	I	RCVFLT (Receiving fault) — 0 : A signal from a transmitter is not received.
20	P53	I	HALTECG — 0 : The host CPU halts the ECG CPU operation.
21	P54	I	LFAULT (Lead fault) — 0 : An electrode is detached.
22	P55	I	TELE (Telemeter) — 0 : The receiver is connected.
23	P56	I	CALL — 0 : Nurse call from the transmitter

Pin No.	Symbol	I / O	Function
24	P57	I	ZBB (ZB transmitter battery) — 0 : Battery level of the transmitter is low.
25~27	P60~P62	O	GAIN0~GAIN2 (Gain selection) — (See Gain Selector section.)
28~30	P63~P65	O	SEL1~SEL2 (Lead selection) — (See Lead Selector section.)
31~32	P66~P67	O	SEL3~SEL4 (Input selection) — (See Input Selector section.)
33	Vcc	I	Power — + 5 V
34~41	A15~A8	O	Address bus
42	Vss	---	Ground (ED)
43~50	A7~A0	I / O	Address bus
51~58	D7~D0	O	Data bus
59	BA	O	Bus available — 1 : The ECG CPU disconnects the bus when the ECG CPU halts.
60	LIR	---	Not used
61	R / W	---	Not used
62	WR	O	Write — 0 : Writes the data into the peripheral devices.
63	RD	O	Read — 0 : Reads the data from the peripheral devices.
64	E	O	ADCLK (A/D conversion clock) — 2 MHz (TEC-7100/7200) 3 MHz (TEC-7300)

3-3-3 HOST CPU (Main Section with UP-7638 Front Panel Board)

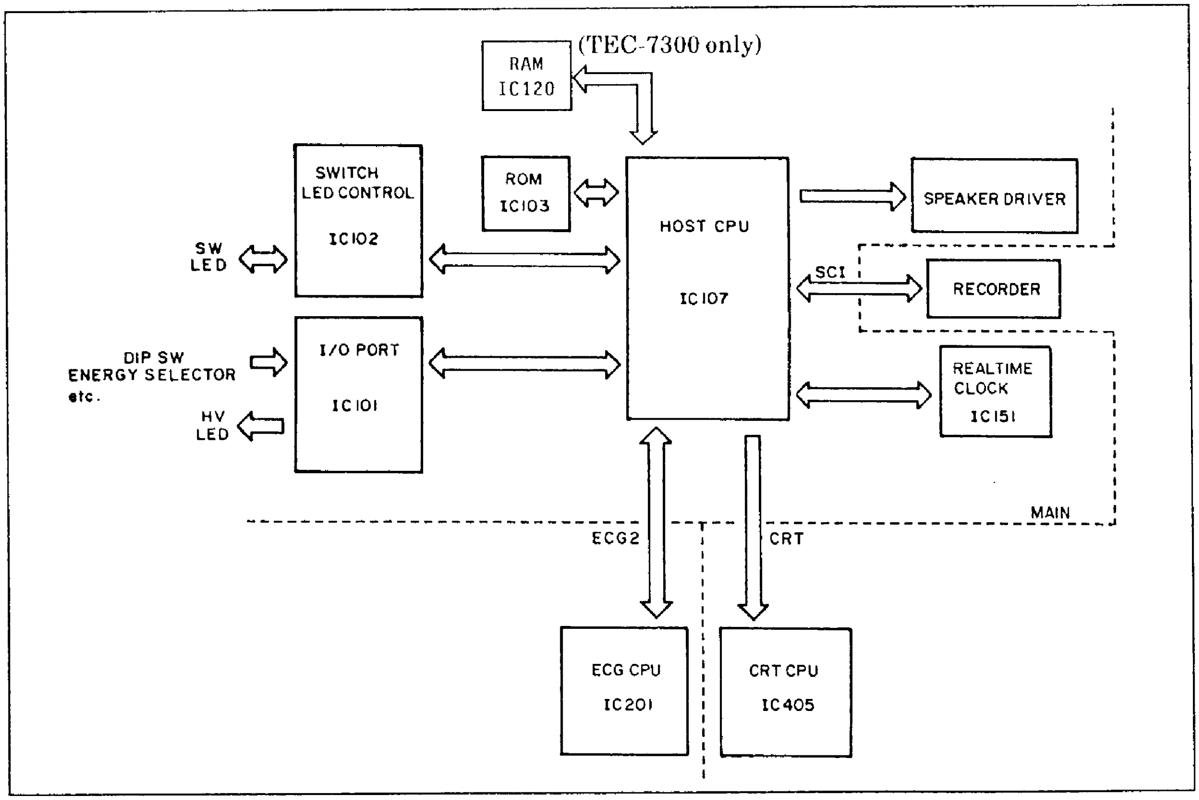
Outline

The host CPU section controls :

- Data transfer to/from ECG CPU, CRT CPU and recorder
- Key entry recognition
- LED and speaker control
- High voltage control
- Time measurement
- VPC recall waveform control (TEC-7300)

The host CPU operates on 2MHz (3MHz in TEC-7300) system clock according to the program in the ROM. The host CPU halts the ECG CPU every 2 msec. and the CRT CPU every 24 msec., and sends serial data directly to the recorder. Keyboard/display inter-face monitors key entry and controls the LED display. I/O port reads DIP switch status data and controls the high voltage unit. If the host CPU runs away, the regularly generated pulse is lost and the CPU is reset by the runaway detector.

Host CPU and Peripheral Blocks


(TEC-7300 only)
RAM IC120
ROM IC103
SWITCH LED CONTROL IC102
HOST CPU IC107
SPEAKER DRIVER
SCI
RECORDER
REALTIME CLOCK IC151
SW LED
DIP SW ENERGY SELECTOR etc.
I/O PORT IC101
HV LED
MAIN
ECG2
CRT
ECG CPU IC201
CRT CPU IC405

Host CPU

An 8 bit micro-processing unit 63B03X IC107 includes a 192 byte RAM, programmable timers, a serial communication interface and uses 19 line I/O ports. The crystal oscillator X100 provides a clock of 8MHz (12MHz in TEC-7300) to IC107.

Host CPU Pin Description

Pin No.	Symbol	I / O	Function
1	Vss	---	Ground
2	XTAL	---	Not used
3	EXTAL	I	Clock 8 MHz (TEC-7100/7200), 12MHz (TEC-7300)
4~5	MP0~MP1	I	Operation mode selection — Mode 1 (MP0 : 1, MP1 : 0)
6	RES	I	Reset — 0 : Resets the CPU when the power is turned on.
7	STBY	I	Not used
8	NMI	I	Non-maskable interrupt — Negative edge causes restart from start address. When RTC signal is lost by program runaway, IC106 outputs "L" NMI.
9	P20	O	QRS sync sound — 1 : ON (for 100 msec.)
10	P21	O	Charge completion sound — 1 : ON
11	P22	O	PRTCLK (Printer clock) — Clock pulse for printer
12	P23	O	Charge LED — 1 : Off or flash, 0 : Lit
13	P24	O	SIN — Serial data synchronized with clock pulse for printer
14	P25	O	Alarm sound — 1 : ON
15	P26	O	Clock — 15.4 kHz for beeps
16	P27	O	STB (Strobe) — 1 : Strobes the thermal head to latch one block data (384 bits).
17	P50	I	IRQ (Interrupt request) — 0 : Sent from Key / LED interface when a key is pressed.
18~20	P51~P53	---	Not used
21	P54	I	OVERCHG (Over charge) — 1 : Overcharge, charge is stopped.
22	P55	I	NO PAPER — 0 : Paper is used up. Absence of paper is indicated by repeated occurrence of this signal.
23	P56	O	AC — 1: AC power source, 0 : DC power source

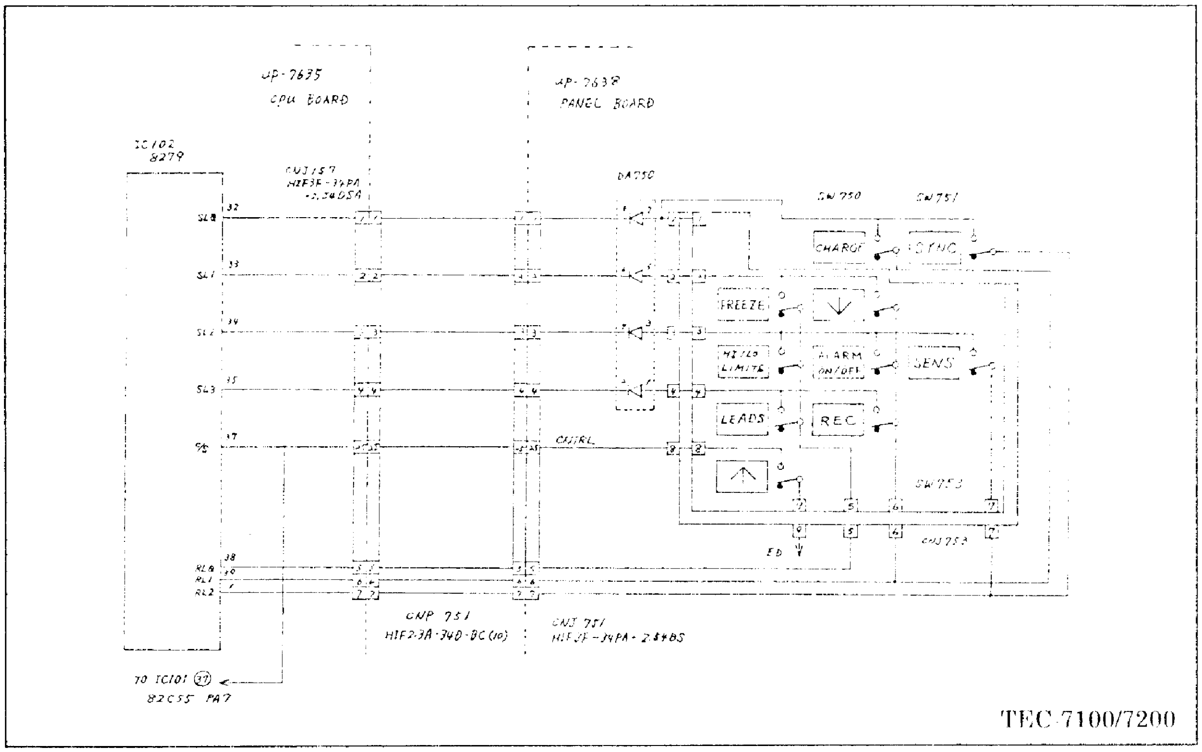
Pin No.	Symbol	I / O	Function
24	P57	O	DCHGCHK (Discharge check) — 0 : While the energy is discharged to terminals in the paddle housing for discharge test.
25	P60	O	BATTOFF — 1 : Turns off battery power source
26	P61	O	HALTCRT — 0 : Halts the CRT CPU to transfer the data to the RAM of CRT CPU
27	P62	O	RTC : Clock pulse of 2 msec.
28	P63	O	HALTECG — 0 : Halts the ECG CPU to transfer the data to / from the RAM of ECG CPU.
29	P64	O	TTRRST (TTR reset) — 1 : Resets the integrator of TTR measurement.
30	P65	---	(TEC-7100/7200) Not used (TEC-7300) DISPSEL — 0 : When the DISPLAY key is pressed.
31	P66	I	(TEC-7100/7200) Sync one time — 0 : Sync mode is released to ASYNC mode auto-matically when the energy is discharged. (TEC-7300) Not used
32	P67	---	(TEC-7100/7200) Not used (TEC-7300) Bank selection for RAM IC120
33	Vcc	I	Power — + 5 V
34~41	A15~A8	O	Address bus
42	Vss	---	Ground (ED)
43~50	A7~A0	O	Address bus
51~58	D7~D0	I / O	Data bus
59	BA	---	Not used
60	LIR	---	Not used
61	R / W	---	Not used
62	WR	O	Write — 0 : Writes the data into the peripheral devices.
63	RD	O	Read — 0 : Reads the data from the peripheral devices.
64	E	O	(TEC-7100/7200) Clock pulse of 2 MHz for the Key / LED interface. (TEC-7300) Not used

I/O Port Pin Description

Pin No.	Symbol	I / O	Function
1~4	PA3~PA0	I	Energy selector position code (See Energy Select section.)
5	RD	I	Read — 0 : The host CPU reads the data or status.
6	CS	I	Chip select — 0 : Selected
7	GND	---	Ground
8~9	A1~A0	I	Port selection (See host CPU address bus section.)
10	PC7	O	EXTRLY* (External discharge relay) — 1 : ON
11	PC6	O	INTRLY* (Internal discharage relay) — 1 : ON
12	PC5	O	CHGON* (Charge on) — 1 : Energy charging starts. * : EXTRLY, INTRLY and CHGON signals are disabled by RST for power-on transit times.
13	PC4	O	REC (Record) — 1 : Recorder starts.
14	PC0	O	LEDRED (Paddle contact red LED) — 1 : ON
15	PC1	O	LEDYEL (Paddle contact yellow LED) — 1 : ON
16	PC2	O	LEDGR (Paddle contact green LED) — 1 : ON
17	PC3	O	CLAMP (Energy charging lamp) — 1 : Lit or OFF, 0 : Flash
18	PB0	I	DIP0 = Time constant — 0 : ECG (3.2 sec.), 1 : Monitor (0.32 sec.)
19	PB1	I	DIP1 = AC filter — 0 : ON
20	PB2	I	DIP2 = Alarm recoding mode — 0 : ON
21	PB3	I	DIP3 = Automatic recording — 0 : ON
22	PB4	I	Not used
23	PB5	I	DIP5 = 3/5-electrode method — 0 : 5 electrodes (P, I , II , III , aVR, aVL, aVF, V, AUX, TELE, TEST) 1 : 3 electrodes (P, I , II , III , TEST)
24	PB6	I	DIP6 = Recording mode — 0 : Realtime , 1 : Delay
25	PB7	I	DIP7 = Paddle sync — 0 : Available
26	Vcc	I	Power — +5V
27~34	D7~D0	I / O	Data bus
35	RST	I	Reset : Grounded to avoid reset by noise
36	WR	I	Write — 0 : The CPU writes the data or control words.
37	PA7	I	CNTL — 0 : ↑ Key is pressed.

Pin No.	Symbol	I / O	Function
38	PA6	I	EXDCHG (External paddle discharge) — 0 : Paddle discharge switches are pressed. Key / LED interface IC102 also monitors this signal to improve reliability.
39~40	PA5~PA4	I	Paddle type (PA 4, PA 5) — (0, 1) : External paddle (1, 0) : Internal paddle (1, 1) : No paddle

Key Entry (UP-7638)


UP-7635
CPU BOARD
UP-7638
PANEL BOARD
IC102
8279
CNJ157
HIF3F-34PA
-2.54DSA
DA750
SW750
SW751
SL0
SL1
SL2
SL3
32
33
34
35
37
38
39
RL0
RL1
RL2
CNTRL
CHARGE
SYNC
FREEZE
HI/LO
LIMITS
ALARM
ON/OFF
SENS
LEADS
REC
SW753
CNJ753
FD
CNP 751
HIF2-3A-34D-DC(10)
CNJ 751
HIF3F-34PA-2.54BS
TO IC101 ㊲
82C55 PA7
TEC-7100/7200

Sheet Key on the Front Panel

Key status is sensed by key/display interface IC102. IC102 has key entry recognition and LED display control function. IC102 generates scan signal S0~S3 to the key matrix connected to UP-7638 front panel board and recognizes the key pressed by return signal R0~R2. While a key is pressed, other key entries are ignored (2-key lock-out mode). For example, when SL1 becomes low while the FREEZE key is pressed, RL0 also becomes low and IC102 recognizes key entry. Other keys are recognized as shown below.

Key Recognition by Low Level of Scan / Return Lines

	RL0	RL1	RL2
SL0	DISCHARGE	CHARGE	SYNC
SL1	FREEZE	↓ (TEC-7100/7200) SELECT (TEC-7300)	-----
SL 2	HI / LO LIMITS	ALARM ON/OFF	SENS
SL 3	LEAD	REC / STOP	-----

---- : Not used

When pressed, IRQ of IC102 (4) becomes high to request an interrupt to the host CPU IC107 (17). After IC107 reads all key data in the FIFO of IC102, IC102 clears the IRQ. The E of IC107 (64) provides the clock pulse 79CLK of 2MHz to IC102.

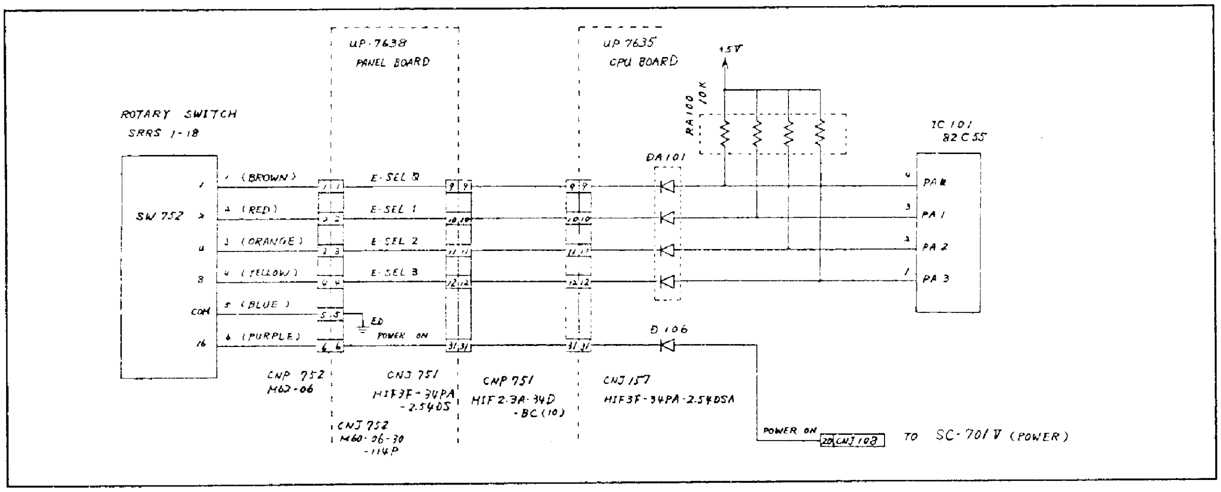
The ↑ key is the only key which is not recognized by IC102 but by the I/O port IC101 because the time setting mode requires pressing two keys (↑ and ALARM ON/OFF) at the same time. When the ↑ key and the other key are depressed, C/S of IC102 (37) becomes low and the other key pressed will select the other function.

Paddle Charge / Discharge

When the paddle charge button is pressed, EXCHG of CNJ157 (16) becomes low. If S0 also becomes low at the same time, R1 becomes low. This condition is the same as if the CHARGE key on the front panel had been pressed.

When the paddle discharge buttons are pressed, EXDICHG of CNJ157 (17) becomes low and similarly the DISCHARGE key is recognized.

Energy Selection

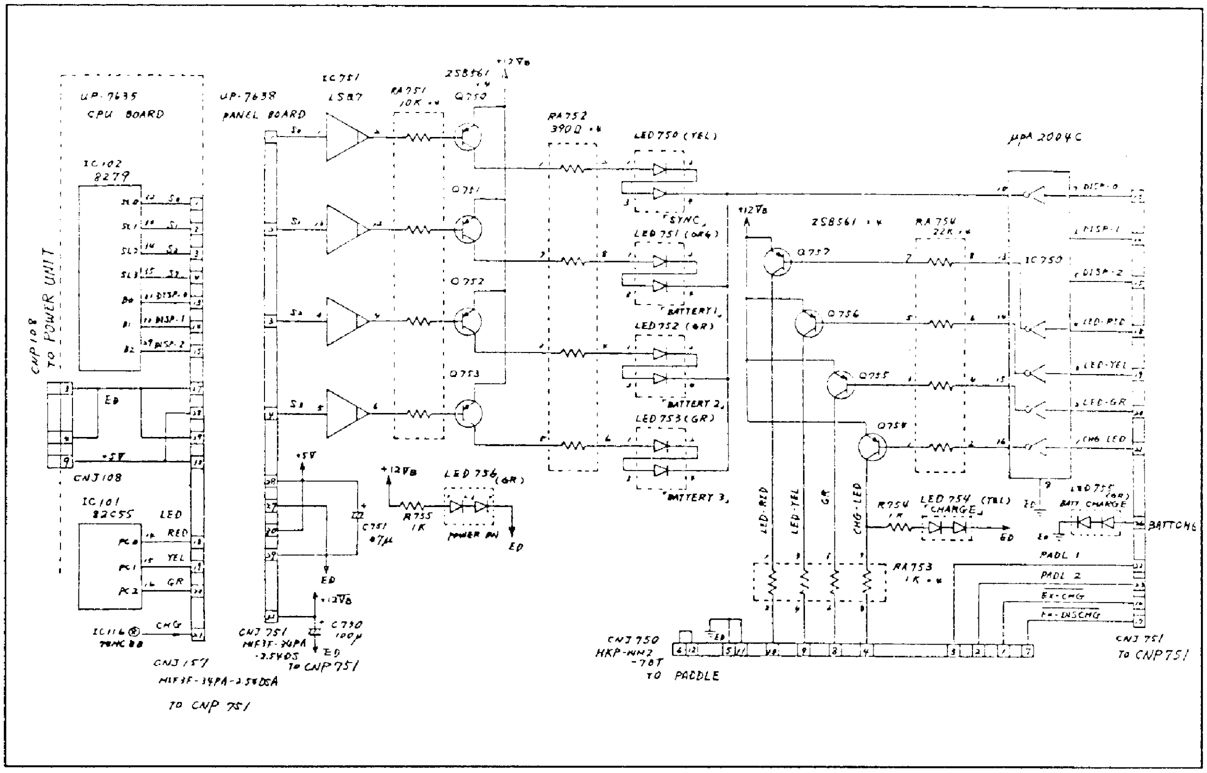

UP-7638
PANEL BOARD
UP 7635
CPU BOARD
+5V
RA100 10K
ROTARY SWITCH
SRRS 1-18
IC101
82C55
DA101
SW752
1 (BROWN)
2 (RED)
3 (ORANGE)
4 (YELLOW)
5 (BLUE)
6 (PURPLE)
1
2
4
8
COM
16
E-SEL 0
E-SEL 1
E-SEL 2
E-SEL 3
ED
POWER ON
PA0
PA1
PA2
PA3
D106
CNP 752
M62-06
CNJ 751
HIF3F-34PA-2.54DS
CNP 751
HIF2.3A-34D-BC(10)
CNJ 157
HIF3F-34PA-2.54DSA
CNJ 752
M60-06-30-114P
POWER ON
CNJ 108
TO SC-701V (POWER)

The energy selector SW752 provides binary codes according to the set position. Energy level information ESEL0~ESEL3 is sent to the I/O port IC101. The POWER ON signal is sent to the power unit. The relationship between the selector position and codes is shown below.

Energy Selector Position and Output Code

Position	Terminal				
	1	2	3	4	6
1 (MON/ECG)	0	0	0	0	0
2 (3J)	1	0	0	0	0
3 (5J)	0	1	0	0	0
4 (10J)	1	1	0	0	0
5 (20J)	0	0	1	0	0
6 (50J)	1	0	1	0	0
7 (70J)	0	1	1	0	0
8 (100J)	1	1	1	0	0
9 (150J)	0	0	0	1	0
10 (200J)	1	0	0	1	0
11 (300J)	0	1	0	1	0
12 (360J)	1	1	0	1	0
13 (30J)	0	0	1	1	0
18 (OFF)	1	0	0	0	1

LED Display (UP-7638)


UP-7635
CPU BOARD
UP-7638
PANEL BOARD
IC102
8279
IC101
82C55
CNJ108
TO POWER UNIT
IC751
LS87
RA751
10K
2SB561
Q750
Q751
Q752
Q753
RA752
390Ω
LED750 (YEL)
SYNC
LED751 (ORG)
BATTERY1
LED752 (GR)
BATTERY 2
LED753 (GR)
BATTERY 3
+12VB
LED756 (GR)
R755
1K
POWER ON
C751
47μ
C750
100μ
CNJ751
TO CNP751
CNJ157
TO CNP751
μPA2004C
IC750
2SB561
Q757
Q756
Q755
Q754
RA754
22K
DISP-0
DISP-1
DISP-2
LED-PTE
LED-YEL
LED-GR
CHG LED
LED755 (GR)
BATT. CHARGE
BATTCHG
R754
1K
LED754 (YEL)
CHARGE
RA753
1K
LED-RED
LED-YEL
GR
CHG-LED
PADL1
PADL2
EX-CHG
FN-DISCHG
CNJ750
TO PADDLE
CNJ751
TO CNP751

Symbol	Color	Name	Operation
LED750	Yellow	SYNC	Lit in SYNC mode.
LED751	Orange	BATTERY 1	Depends on the battery level.
LED752	Green	BATTERY 2	Depends on the battery level.
LED753	Green	BATTERY 3	Depends on the battery level.
LED754 D050	Yellow	CHARGE	Flashes during energy charging. Lit when energy charge is completed.
LED755	Green	BATT CHG	Lit during battery charging.
LED756	Green	POWER ON	Lit while the power is on.
D051	Green	GOOD	Paddle contact impedance : $\leqq 100\Omega$
D052	Yellow	-----	Paddle contact impedance : $100 \sim 200\Omega$
D053	Orange	POOR	Paddle contact impedance : $\geqq 200\Omega$

LEDs on the front panel and the paddle are controlled by the host CPU, I/O port, key/LED interface and power unit, etc. The function of each LEDs is listed above.

SYNC and BATTERY LEDs LED750~LED753

These LEDs are controlled by scan lines S0~S3 and DISP-0 signal of the key/LED interface IC102. For example, when SL0 becomes low and DISP-0 becomes high, LED750 lights.

BATT CHG LED LED755

When the battery is charged, battery charging voltage BATTCHG is applied to LED755 through the battery detector switch.

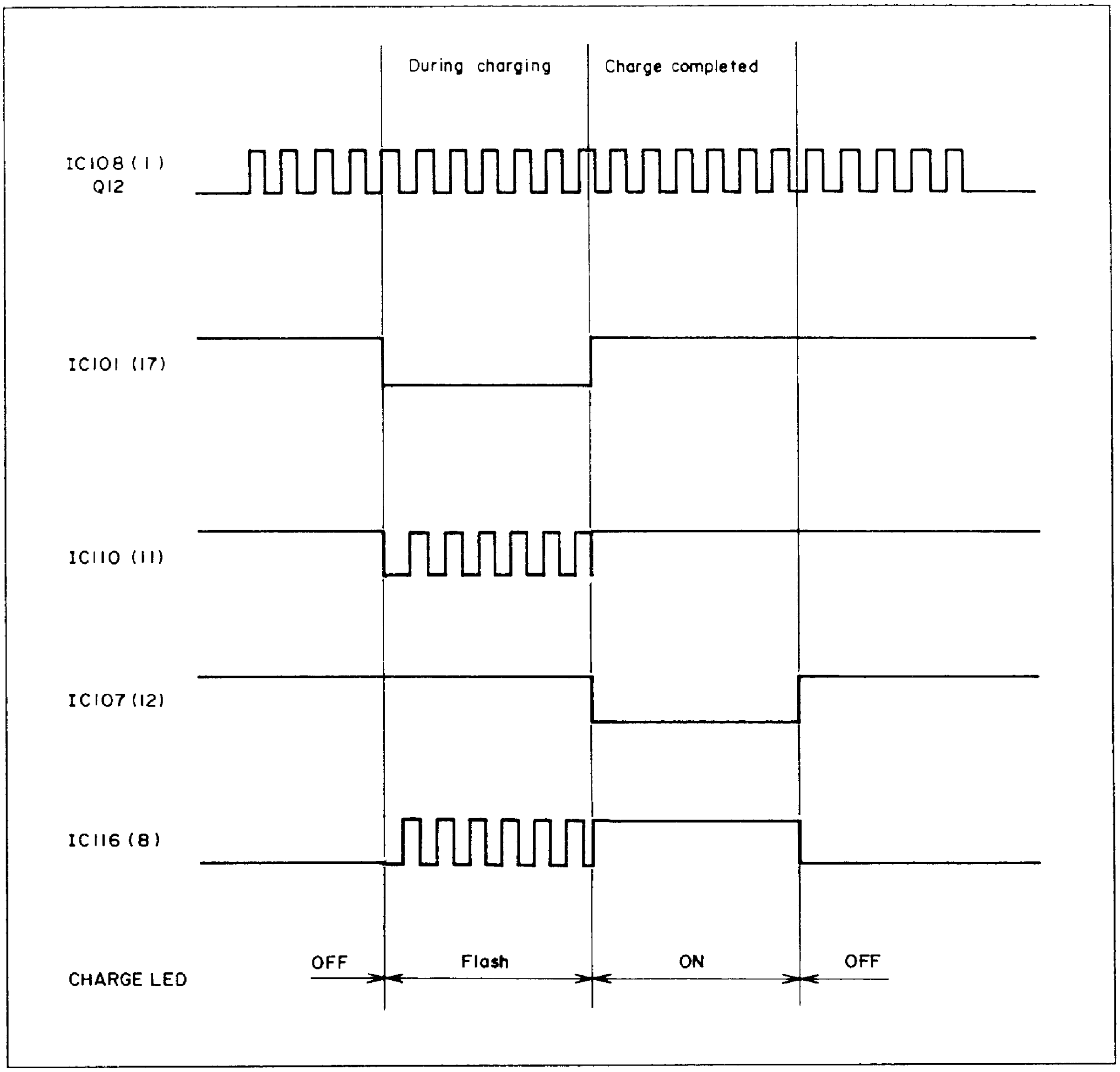
POWER ON LED LED756

When the power is turned on, +12V is supplied and the LED lights.

PADDLE CONTACT LED LED051~LED053 (TEC-7200 only)

The I/O port outputs high to one of LEDRED, LEDYEL and LEDGR (IC750 ④~②) depending on the paddle contact impedance.

Charge LED Control Timing


During charging
Charge completed
IC108 (1) Q12
IC101 (17)
IC110 (11)
IC107 (12)
IC116 (8)
CHARGE LED
OFF
Flash
ON
OFF

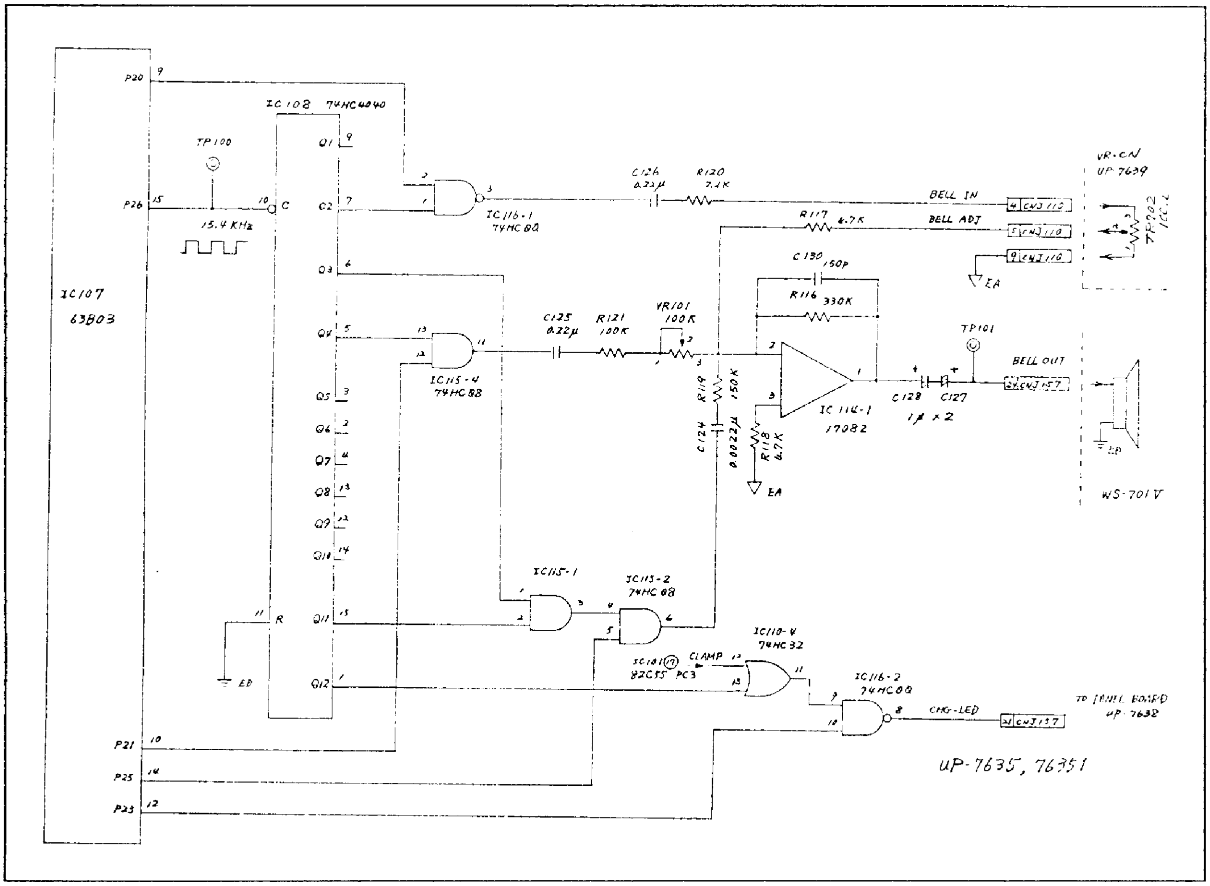
CHARGE LED LED754, LED050

(See the circuit shown in Sound Control section)
When energy charging starts, CLAMP of the I/O port IC101 (17) becomes low to enable the OR gate IC110-4 (11) to output a square waveform of 3.8Hz from the frequency divider IC108 (1). CHGLED of NAND gate IC116 (8) flashes LED754 on the front panel and LED050 on the external paddle until charging is completed. When charging is completed, P23 of the host CPU IC107 (12) outputs low, CHGLED becomes high and the LED lights steadily. When the energy is discharged, IC107 (12) becomes high and the LED goes off.

Sound Control

Charge completion, QRS sync and alarm sounds are controlled by IC107, IC108 and related gates.

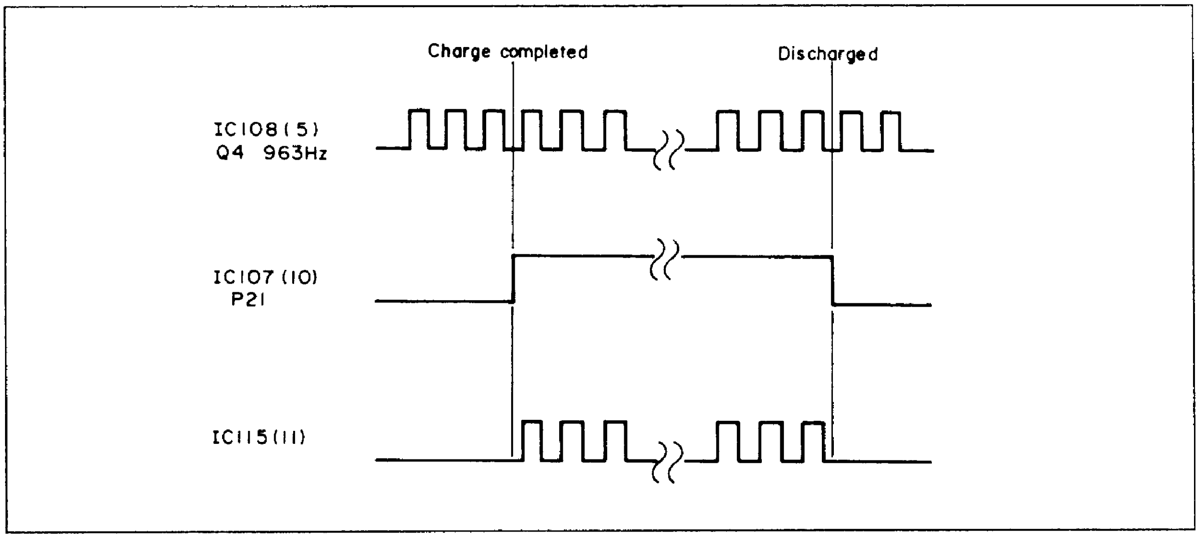
Sound and CHARGE LED control


IC107
63B03
P20
P26
P21
P25
P23
IC108 74HC4040
TP100
15.4 KHz
C
R
ED
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
IC116-1
74HC00
IC115-4
74HC08
IC115-1
IC115-2
74HC08
IC110-V
74HC32
IC101⑰
82C55 PC3
CLAMP
IC116-2
74HC00
CHG-LED
CNJ157
TO PANEL BOARD
uP-7638
C126
0.22μ
R120
2.2K
BELL IN
CNJ110
R117
4.7K
BELL ADJ
EA
VR-CN
uP-7639
TP202
C125
0.22μ
R121
100K
VR101
100K
C130
150P
R116
330K
R119
150K
C124
0.0022μ
R118
4.7K
IC114-1
17082
TP101
C128
C127
1μ × 2
BELL OUT
WS-701V
uP-7635, 76351

Energy Charge Completion Sound

When the energy charge is completed, P21 of IC107 (10) becomes high and a square waveform of approx. 963Hz is generated at Q4 of the frequency divider IC108 (5). A sound of 963Hz is emitted until the energy is discharged.

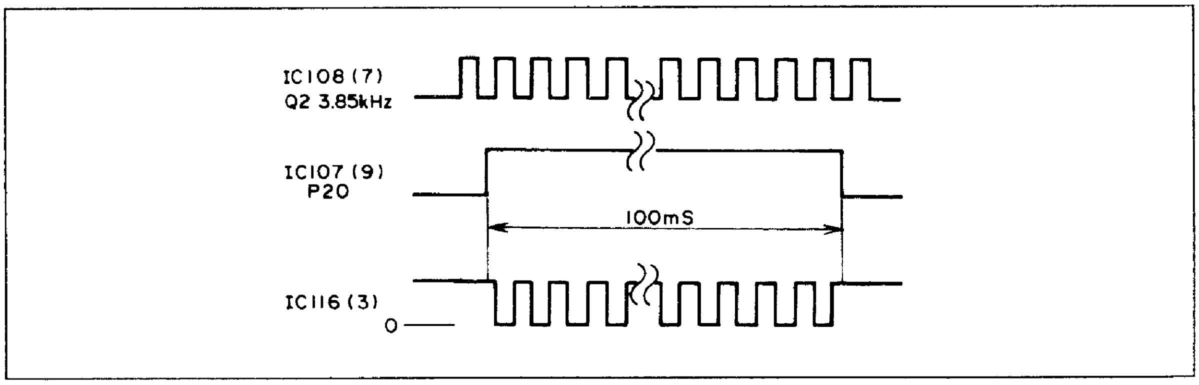
Charge Completion Sound Control Timing


Charge completed
Discharged
IC108 (5)
Q4 963Hz
IC107 (10)
P21
IC115 (11)

QRS Sync Sound

P20 of IC107 (9) becomes high in synchronization with the QRS. Q2 of IC108 (7) constantly provides a square waveform of 3.85kHz. The sound of 3.85kHz is emitted for 100 msec. in synchronization with the QRS.

Sync Control Timing


IC108 (7)
Q2 3.85kHz
IC107 (9)
P20
100mS
IC116 (3)
0

Alarm Sound

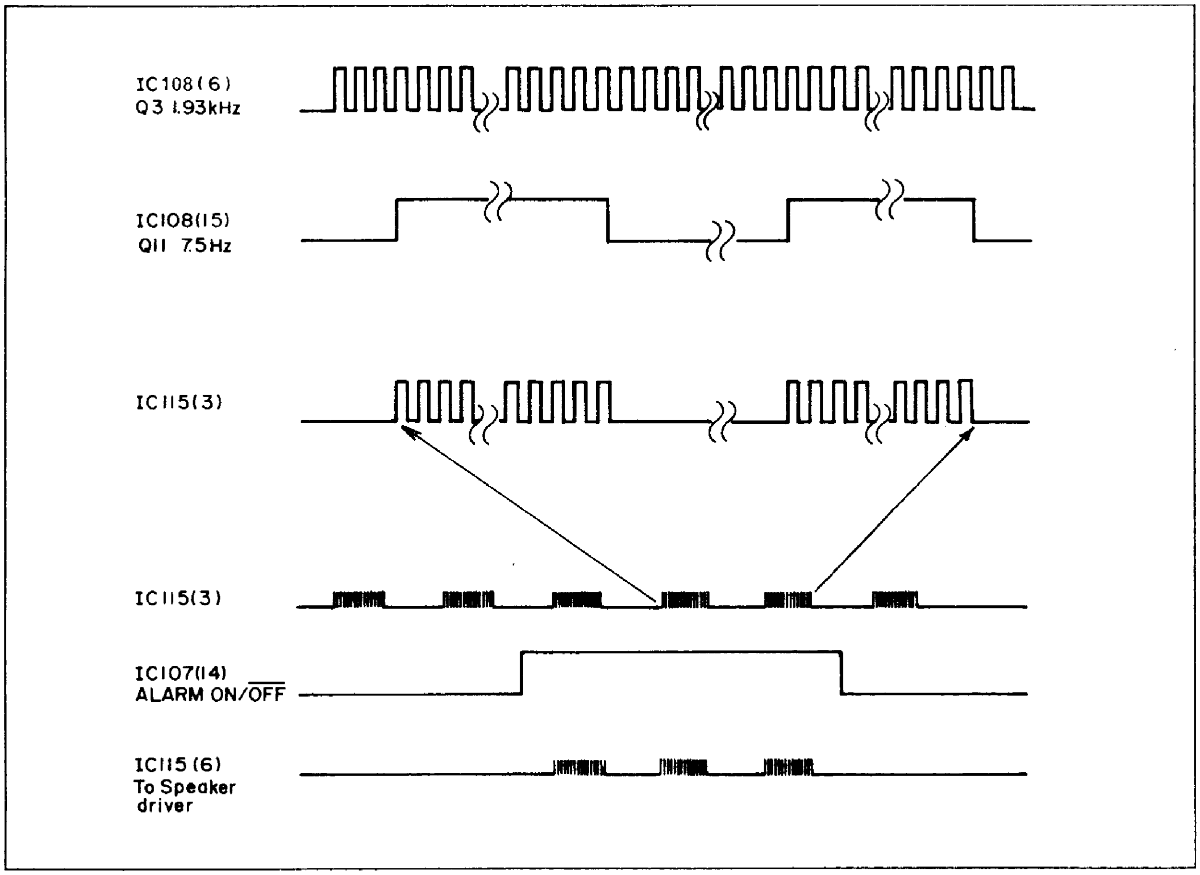
According to the cause of alarm, the alarm sounding time is determined as follows :

Sound is emitted for 3 sec.
- NG (TEST AT 50J)
- PAPER EMPTY
- ERROR 1~4

Sound continues
- LOW BATTERY
- NURSE CALL (When using a transmitter)
- SIGNAL LOSS (When using a transmitter)
- When heart rate exceeds the limits

A square waveform of 1.93kHz at Q3 of IC108 (6) and that of 7.5Hz at Q11 of IC108 (15) provides an intermittent sound. While P25 of IC107 (14) outputs high, a sound is emitted.

Alarm Sound Control Timing


IC108 (6)
Q3 1.93kHz
IC108(15)
Q11 7.5Hz
IC115(3)
IC115(3)
IC107(14)
ALARM ON/$\overline{\text{OFF}}$
IC115 (6)
To Speaker driver

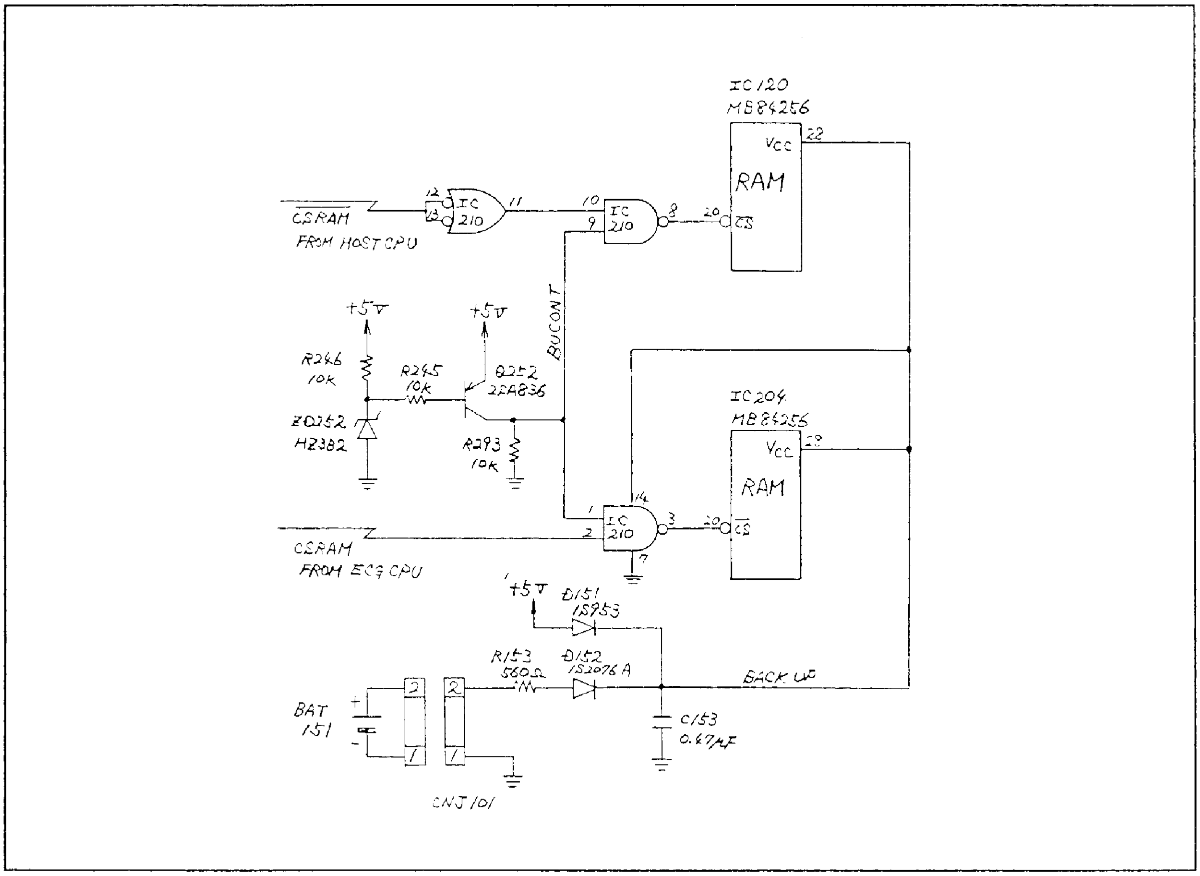
Speaker Driver

IC114-1 amplifies pulses from the above circuits to drive the speaker. C127 and C128 cut DC components of the signal. VR702 on the UP-7639 VR and a connector board adjust the sync sound volume. VR101 adjusts charge completion sound volume.

RAM Data Backup (TEC-7300 only)

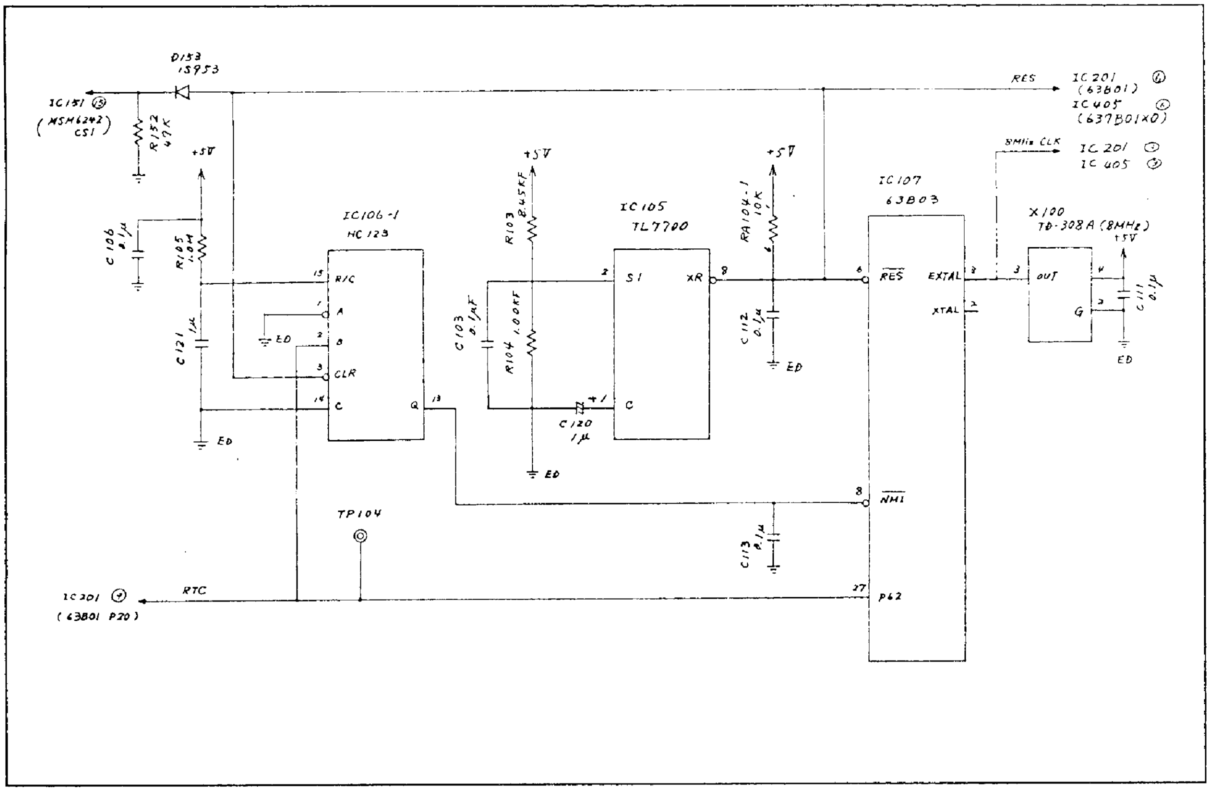
The battery BAT151 provides backup for RAMs. The higher of the two voltages of +5V and BAT151 is selected by D151 and D152. When the power is off or the supply voltage of +5V is less than approx 4V, the BUCONT signal is low and $\overline{\text{CS}}$ of the RAMs becomes high to prevent noise from appearing in the data.

RAM Data Backup


IC120
MB84256
Vcc
22
RAM
CS
20
CSRAM
FROM HOST CPU
12
13
IC 210
11
10
9
IC 210
8
BUCONT
+5V
+5V
R246
10K
R245
10k
Q252
2SA836
ZD252
HZ3B2
R293
10K
IC204
MB84256
Vcc
22
RAM
CS
20
14
1
2
IC 210
3
7
CSRAM
FROM ECG CPU
+5V
D151
1S953
R153
560Ω
D152
1S2076 A
BACK UP
BAT
151
+
-
2
2
1
1
C153
0.47μF
CNJ101

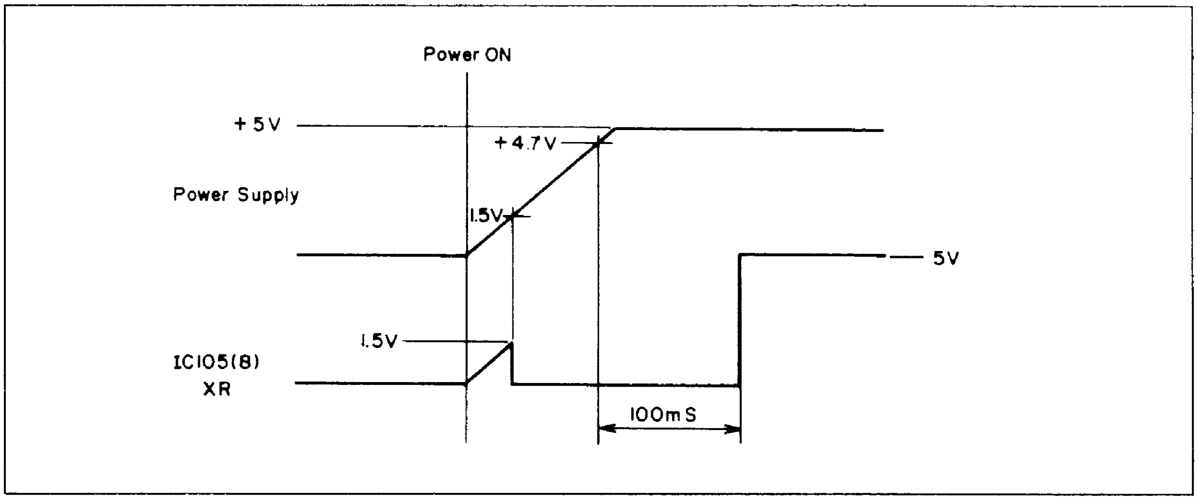
Power-on Reset

Power-on Reset and Runaway Detection


D153
1S953
IC151 ⑮
(MSM6242 CS1)
R152 47K
+5V
C106 0.1μ
R105 1.0M
C121 1μ
ED
IC106-1
HC123
15 R/C
1 A
2 B
3 CLR
14 C
Q 13
+5V
R103 8.45KF
C103 0.1μF
R104 1.00KF
C120 1μ
+1
ED
IC105
TL7700
2 S1
C
XR 8
+5V
RA104-1 10K
C112 0.1μ
ED
RES
IC201 ⑥
(63B01)
IC405 ⑥
(637B01X0)
8MHz CLK
IC201 ③
IC405 ③
IC107
63B03
6 RES
EXTAL 3
XTAL 2
8 NMI
27 P62
X100
TD-308A (8MHz)
+5V
3 OUT
4
2 G
C111 0.1μ
ED
C113 0.1μ
TP104
RTC
IC201 ④
(63801 P20)

The voltage monitor IC105 monitors the power supply voltage and resets CPUs until the voltage reaches a steady state when turning on the power. After the power is turned on, the voltage reaches 1.5V in transit, IC105 starts operating and XR (open collector out) of IC105 (8) turns on. RES (reset) of IC107 becomes low and IC107 is reset. XR is kept low until 100 msec. after the power supply voltage reaches 4.7V. The waiting time of 100 msec. is determined by C120 which is charged by IC105 (1). RES pulse also resets the ECG CPU IC201 and CRT CPU IC405.

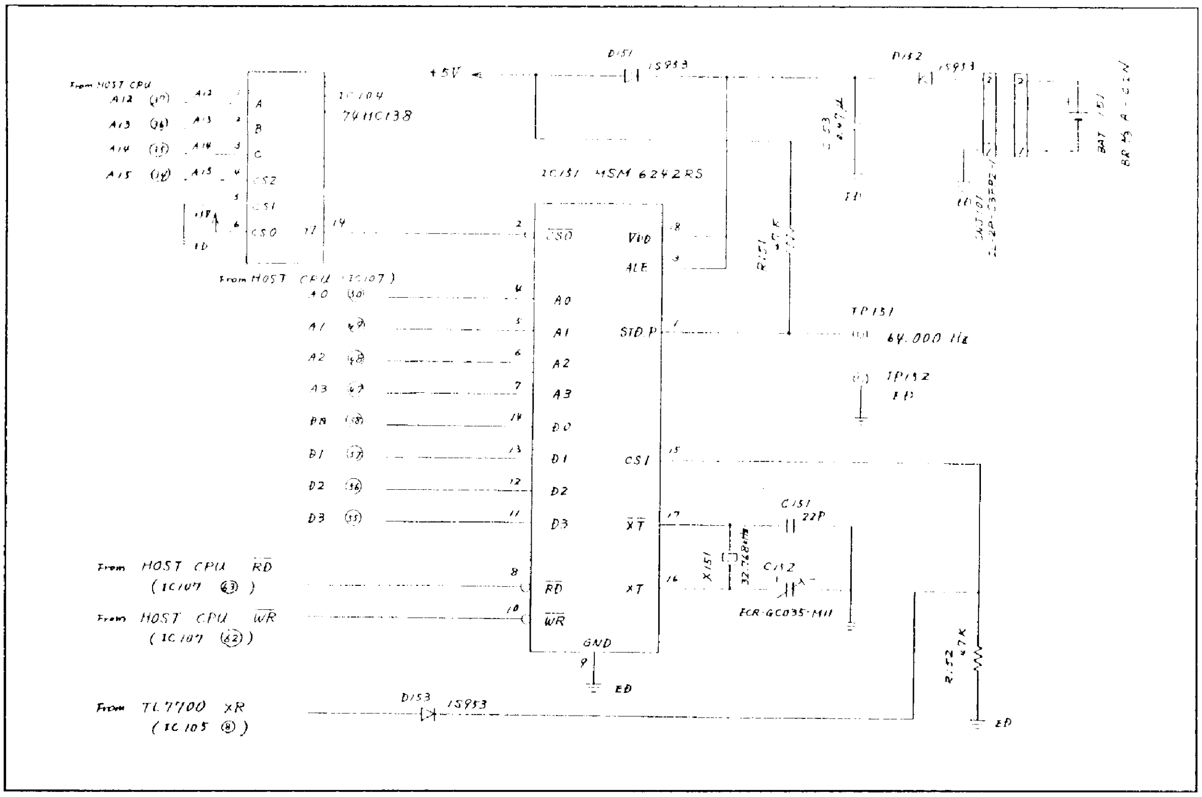
Power-on Reset Timing



Runaway Detection

IC107 (27) constantly generates a clock pulse RTC of 2 msec. Re-triggerable monostable multivibrator IC106 (13) Q outputs a pulse of 1 sec. determined by the product of C121 (1μF) and R105 (1MΩ) when a pulse is applied to B IC106 (3). While 2 msec. pulses are successively input to B, Q continuously outputs high. If IC107 runs away, the 2 msec. pulse disappears so that Q becomes low 1 sec. later and IC107 is restarted from start address.

Real-time Clock


From HOST CPU
IC104
74HC138
+5V
D151
1S953
D152
IC151 MSM6242RS
CS0
VDD
ALE
A0
A1
A2
A3
D0
D1
D2
D3
STD.P
CS1
XT
RD
WR
GND
TP151
64.000Hz
TP152
C151
22P
C152
X151
32.768kHz
ECR-GC035-M11
R151
R152
4.7K
C153
BAT151
BR
From HOST CPU RD
(IC107 43)
From HOST CPU WR
(IC107 42)
From TL7700 XR
(IC105 8)
D153
1S953

IC151 is a real-time clock with calendar function operated on either the instrument's power supply or the lithium battery BAT151.

When the power of +5V is turned off, IC151 is powered by BAT151 of +3V (standby condition) in a state of lower power consumption. In this condition, clock function is internally available but interface with other devices is not guaranteed.

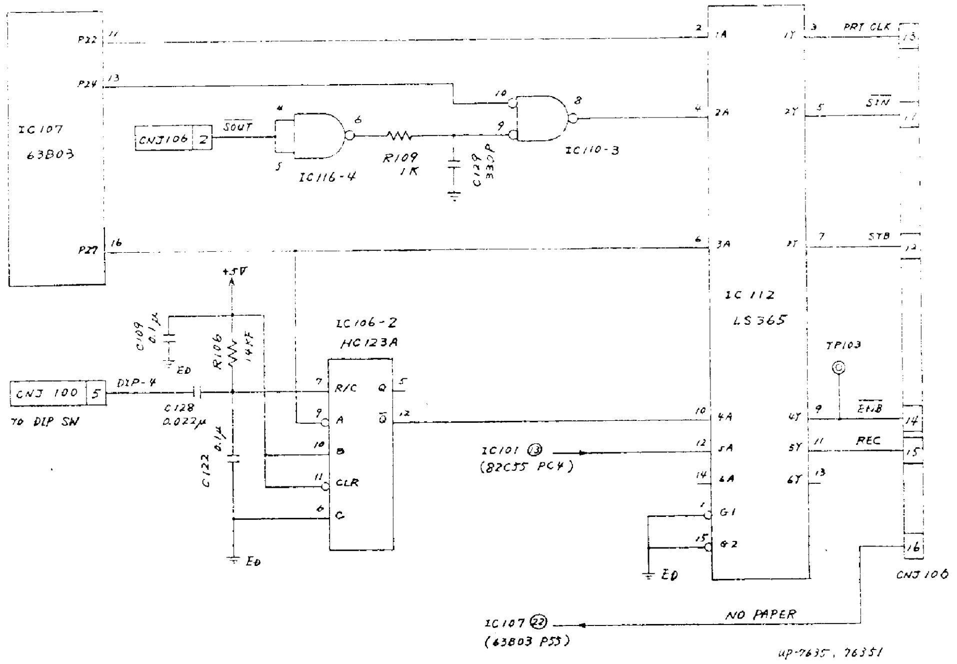
When the power is turned on, D151 turns on, D152 turns off and +5V power source is selected. In transit state to/from standby condition, CS1 (chip select) of IC151 (15) is kept low to disable to break the clock data. CS1 is controlled by the voltage monitor IC105 (See the power on reset). When VDD of IC151 becomes 4.0V and IC151 is released from standby condition as the threshold level of power supply voltage for the standby is 4.0V, CS1 becomes high and the interface becomes available 100 msec. after the power supply voltage reaches 4.7V.

The external crystal oscillator X151 provides 32.768kHz. This oscillation pulse divided into 64.000Hz at STD.P is adjusted with C152.

Low level of CS0 allows IC151 to access to external devices.

Data Transfer to Recorder

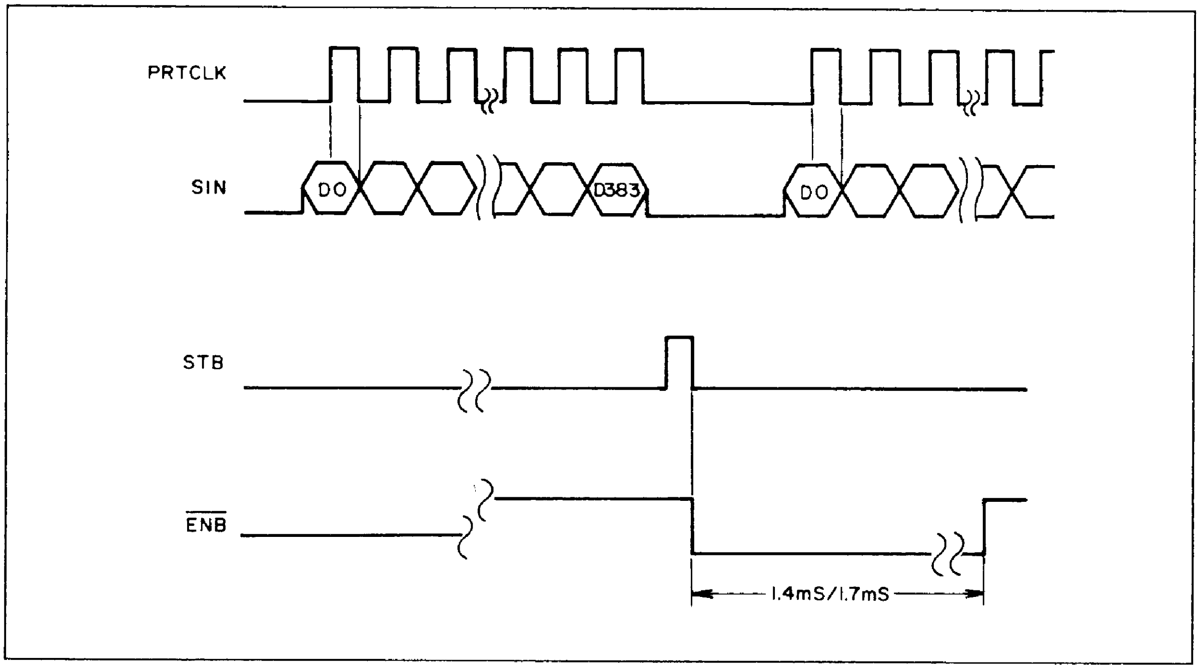
Recording Data Transfer


IC107
63B03
P22
P24
P27
11
13
16
CNJ106 2
$\overline{SOUT}$
IC116-4
R109
1K
C129
330P
IC110-3
IC112
LS365
1A
2A
3A
4A
5A
6A
G1
G2
1Y
2Y
3Y
4Y
5Y
6Y
PRT CLK
$\overline{SIN}$
STB
$\overline{ENB}$
REC
TP103
CNJ106
+5V
C109
0.1μ
R106
14KF
ED
CNJ 100 5
TO DIP SW
DIP-4
C128
0.022μ
C122
0.1μ
IC106-2
HC123A
R/C
A
B
CLR
C
Q
$\overline{Q}$
IC101 ⑬
(82C55 PC4)
IC107 ㉒
(63B03 P55)
NO PAPER
up-7635, 76351

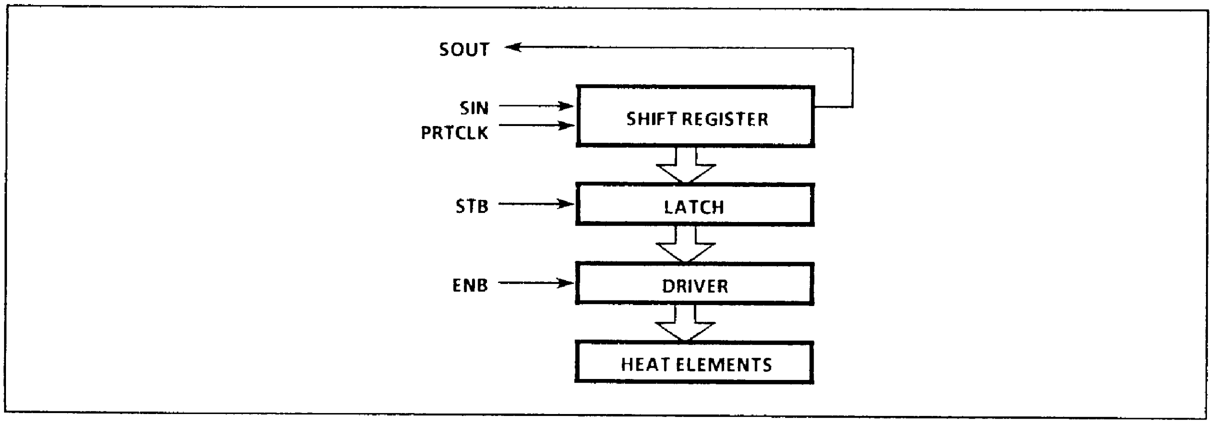
Recording data is transferred from the serial communication interface (SCI) of the host CPU IC107 to the thermal head in the recorder.

The serial data SIN is output from the SCI P24 of IC107 (13) in synchronization with the PRTCLK (printer clock). When one row line data of 384 points — 8 dots /mm × 48mm (recording width) — is output to the shift register in the thermal head for serial-to-parallel conversion, a STB (strobe) pulse appears at P27 of IC107 (16) to latch the data. Negative going edge of STB allows the monostable multivibrator IC106-2 to generate a low pulse ENB (enable) to drive heat elements. The pulse width of ENB determined by R106, C122 and C128 controls the darkness (temperature) of the recording trace. When No. 4 of the DIP switch on the side panel is set to "HIGH" (using Nihon Kohden specified paper), CNJ100 (5) is opened, C122 and R106 generates ENB of 1.4ms. When set to "PPR SENS" (using medium sensitivity paper), CNJ100 (5) is grounded, C122, C128 and R106 generates ENB of 1.7ms.

Recording Data Transfer Timing


PRTCLK
SIN
DO
D383
DO
STB
ENB
1.4mS/1.7mS

Thermal Head Block Diagram


SOUT
SIN
PRTCLK
SHIFT REGISTER
STB
LATCH
ENB
DRIVER
HEAT ELEMENTS

When the same heat element is continuously heated, excessive heating resulting in the shortening of the life of the thermal head occurs. To avoid two heatings successively, carry SOUT from the shift register controls the SIN. When a certain element has been heated in the previous cycle, SOUT becomes low to block the SIN.

3-3-4 CRT CPU

Outline

The CRT CPU section controls :

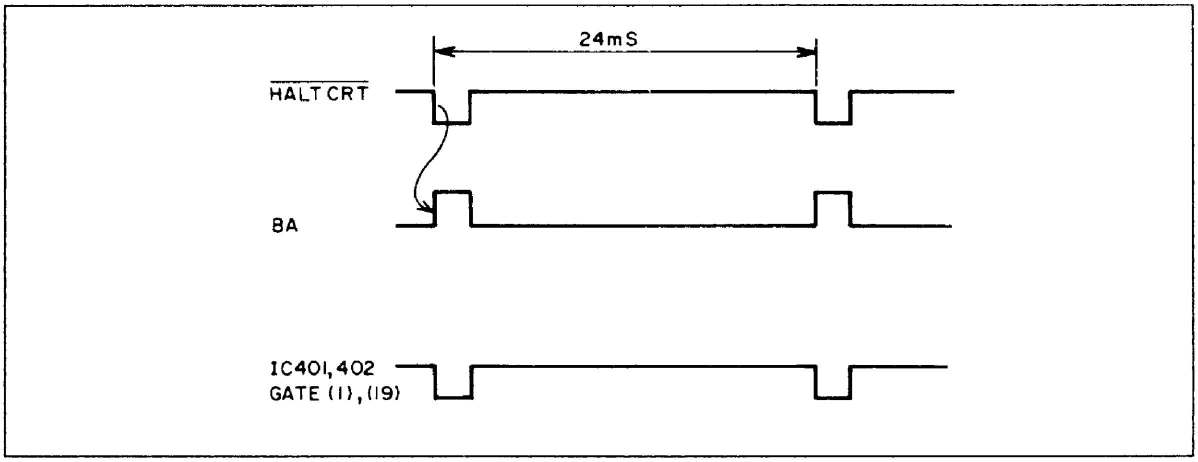
Display data transfer from the host CPU through the CRT CPU RAM
Peak-bottom processing of ECG waveform
D/A conversion of the waveform
Timing control signal generation for the CRT driver

The CRT CPU operates on 2MHz system clock according to the program in the internal ROM (TEC-7100/7200) or ROM IC413 (TEC-7300). The host CPU halts the CRT CPU every 24 msec. to transfer the data. After the data is transferred, the CRT CPU sends one frame data, the D/A converted ECG waveform of two channels for XY display mode and the serial character data for raster scan display mode, with timing control signals to the CRT driver.

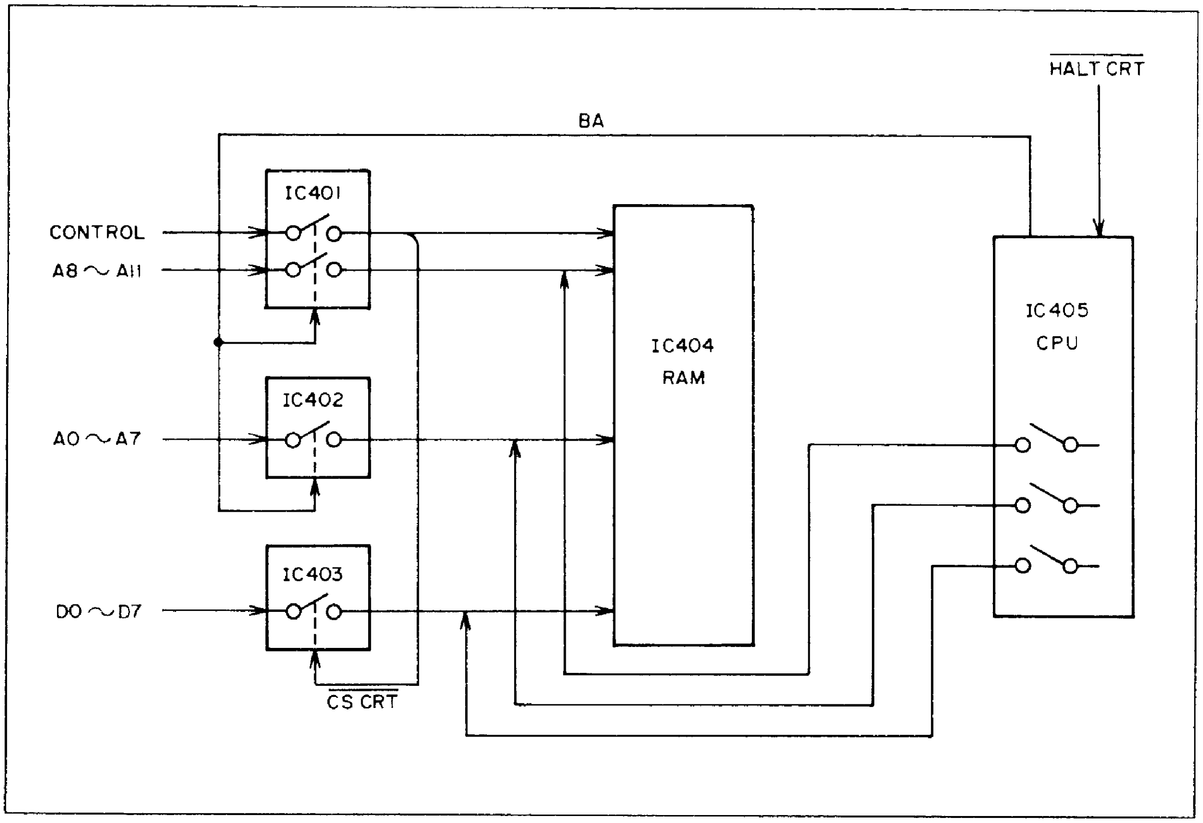
Communication with the Host CPU

Every 24 msec. the host CPU halts the CRT CPU IC405 and transfers the data to the CRT CPU RAM IC404. When HALTCRT becomes low, the CRT CPU disconnects the bus line from itself and BA (bus available) becomes high to turn on the three-state buffer IC401~402 for the control and address bus. When the host CPU writes the data to IC404, CSCRT becomes low to turn on the bi-directional three-state buffer IC403 for the data bus and to enable IC404 to access data. RD controls the transfer direction of the buffer.

CRT ECG Data Bus Control Cycle



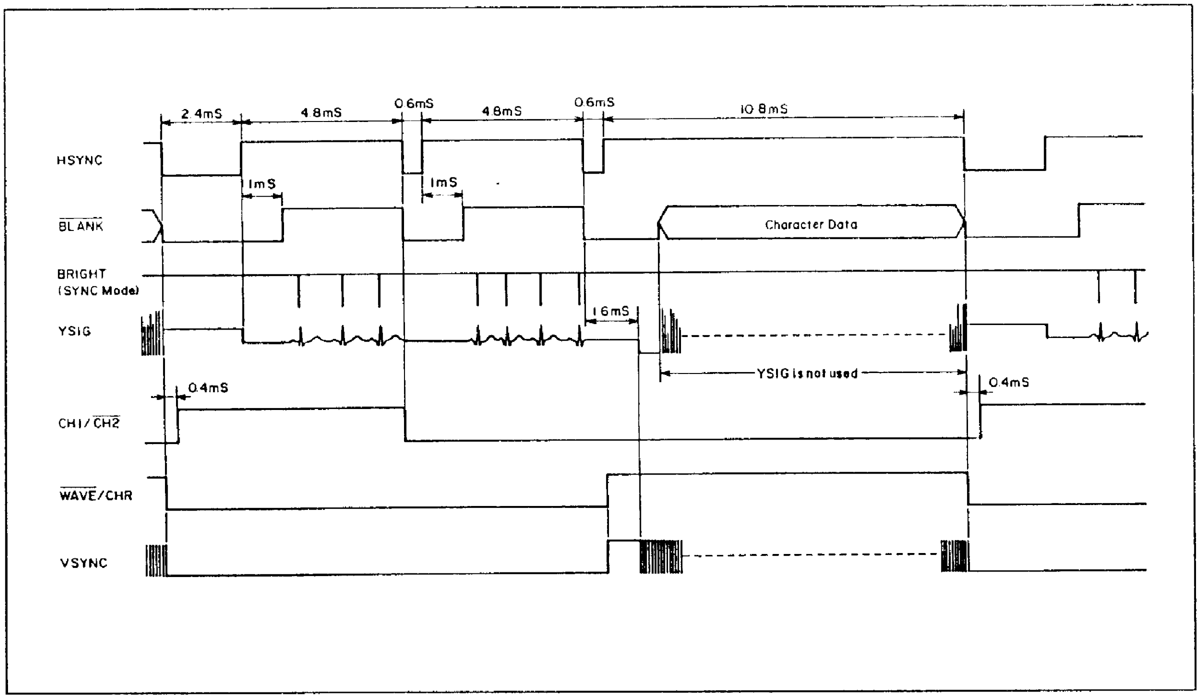
CRT CPU Data Bus Control


HALT CRT
BA
IC401
CONTROL
A8 ~ A11
IC404
RAM
IC405
CPU
IC402
A0 ~ A7
IC403
D0 ~ D7
CS CRT

One-frame Display Cycle

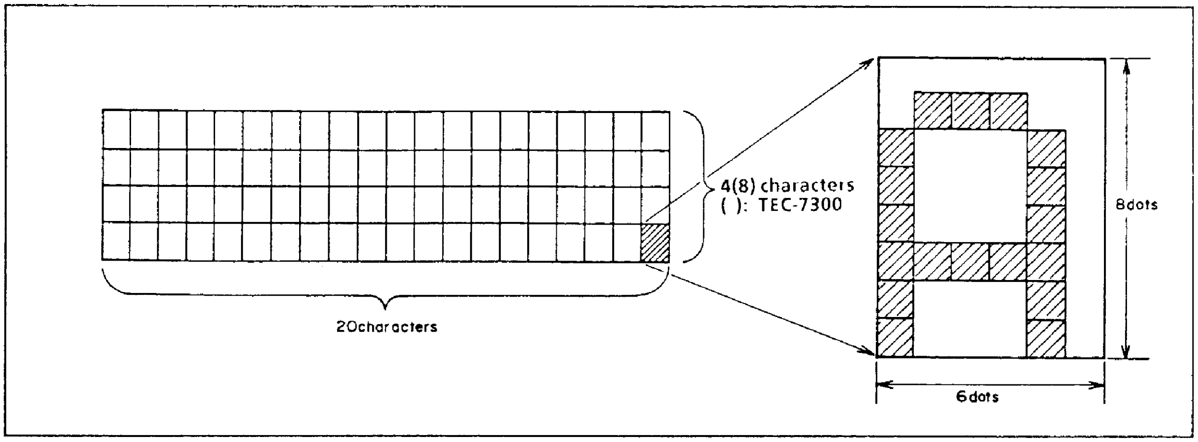
Horizontal sweeps are made while the HSYNC is high. Two sweeps for ECG waveforms and one sweep for characters are made in one cycle. The WAVE/CHR selects the display mode, the XY mode for the ECG waveforms and the raster scan mode for the characters. D/A converted waveform signal YSIG is displayed while BLANK is high. The BRIGHT pulse intensifies the brightness of the ECG waveform to display the QRS synchronized spot in SYNC mode. The vertical position of the ECG is controlled by the CH1/CH2. Raster timing for characters is controlled by the HSYNC and VSYNC. Character data modulates the BLANK.

Waveform and Character Data Transfer Timing


2.4mS
4.8mS
0.6mS
4.8mS
0.6mS
10.8mS
HSYNC
1mS
1mS
BLANK
Character Data
BRIGHT
(SYNC Mode)
1.6mS
YSIG
YSIG is not used
0.4mS
0.4mS
CH1/CH2
WAVE/CHR
VSYNC

Character Data Transfer to CRT Driver

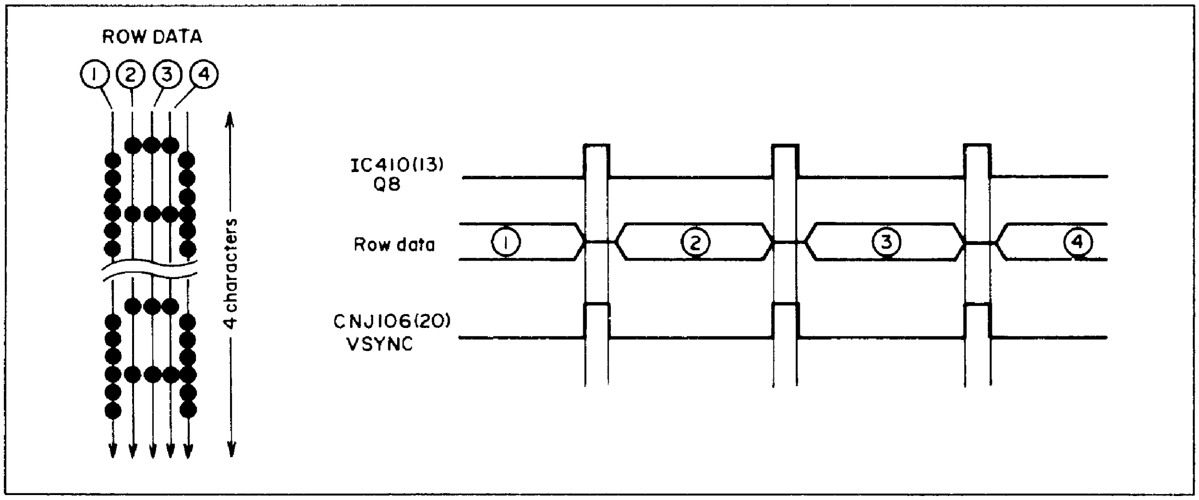
Character Display Area


4(8) characters
( ): TEC-7300
20characters
8dots
6dots

Vertical Sync VSYNC

VSYNC at CNJ106 (20) triggers a vertical scan. VSYNC is controlled by Q8 of the frequency divider IC410 (13) and P25 of the CRT CPU IC405 (14). Q8 becomes low by P23 output to reset IC410. P25 is low in character display mode. When VSYNC becomes low, the scan starts. While VSYNC is low, one vertical line data of four characters (8 dots×4(8) characters=32(64) dots, ( ): TEC-7300) is transferred to the CRT driver.

Character Data Transfer Timing (4 vertical scans)

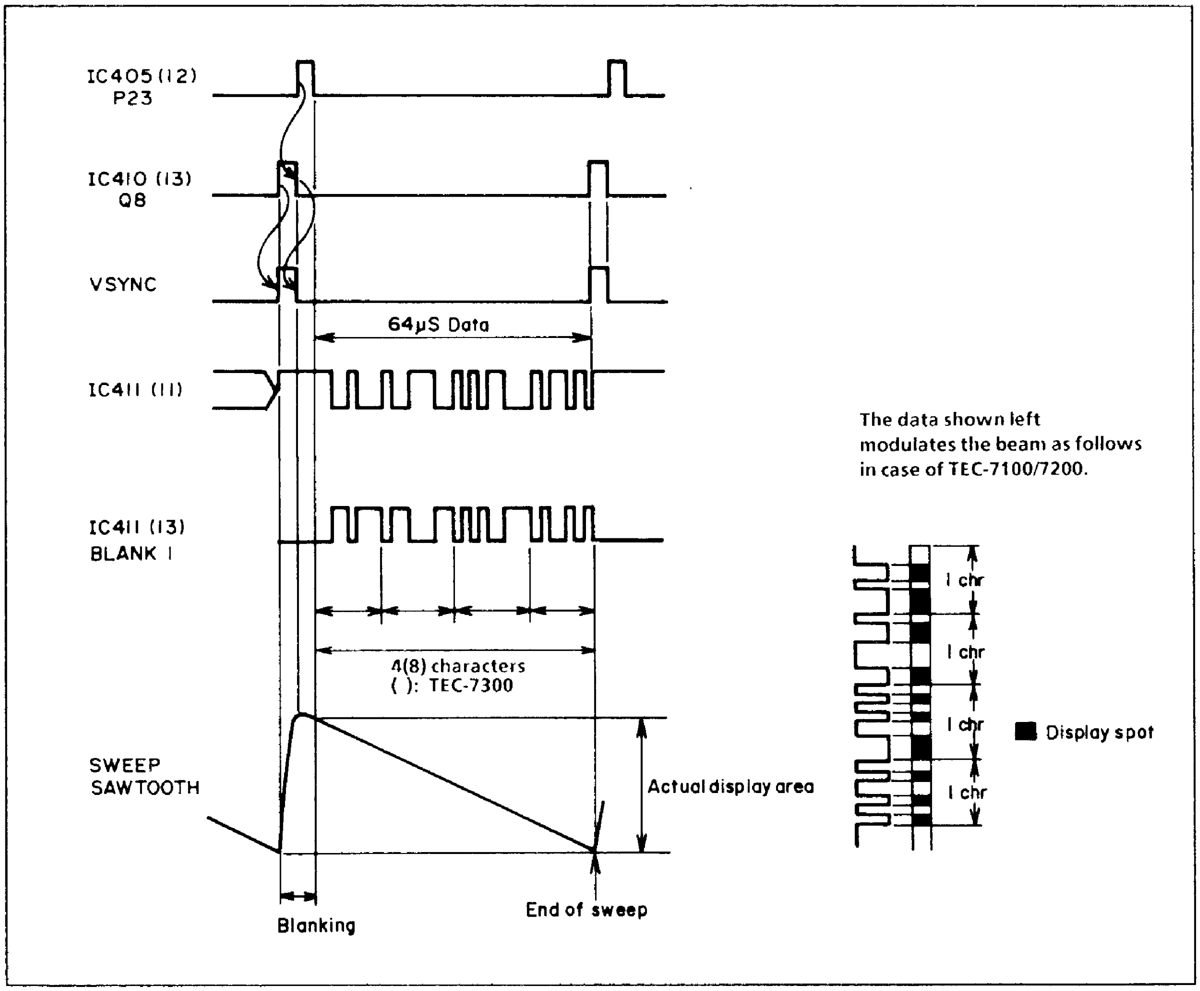

ROW DATA
①②③④
4 characters
IC410(13)
Q8
Row data
①
②
③
④
CNJ106(20)
VSYNC

Blanking BLANK1

BLANK1 has two functions : blanking the beam between the end of one sweep and the beginning of the next sweep and modulating the beam to display characters according to the character data.

After 32 dots (64 dots in TEC-7300) data are transferred, the beam is blanked according to the following logic. Q8 becomes high, VSYNC becomes high, STRB (strobe) of multiplexer IC409 (7) becomes high, Y out becomes low, IC411 (11) becomes high and BLANK1 of IC411 (13) becomes low. Then P23 of IC405 (12) becomes high, IC410 is reset, Q8 becomes low, VSYNC becomes low and the next scan starts. BLANK1 is still low because P23 is kept high. As the beginning area of the scan is not exactly linear, characters are not displayed in this area. When the scan reaches the display area, P23 becomes low, IC410 starts counting and the data is transferred. According to the data, Y of multiplexer IC409 modulates BLANK1.

Character Data Transfer Timing (One vertical scan for 4 characters)

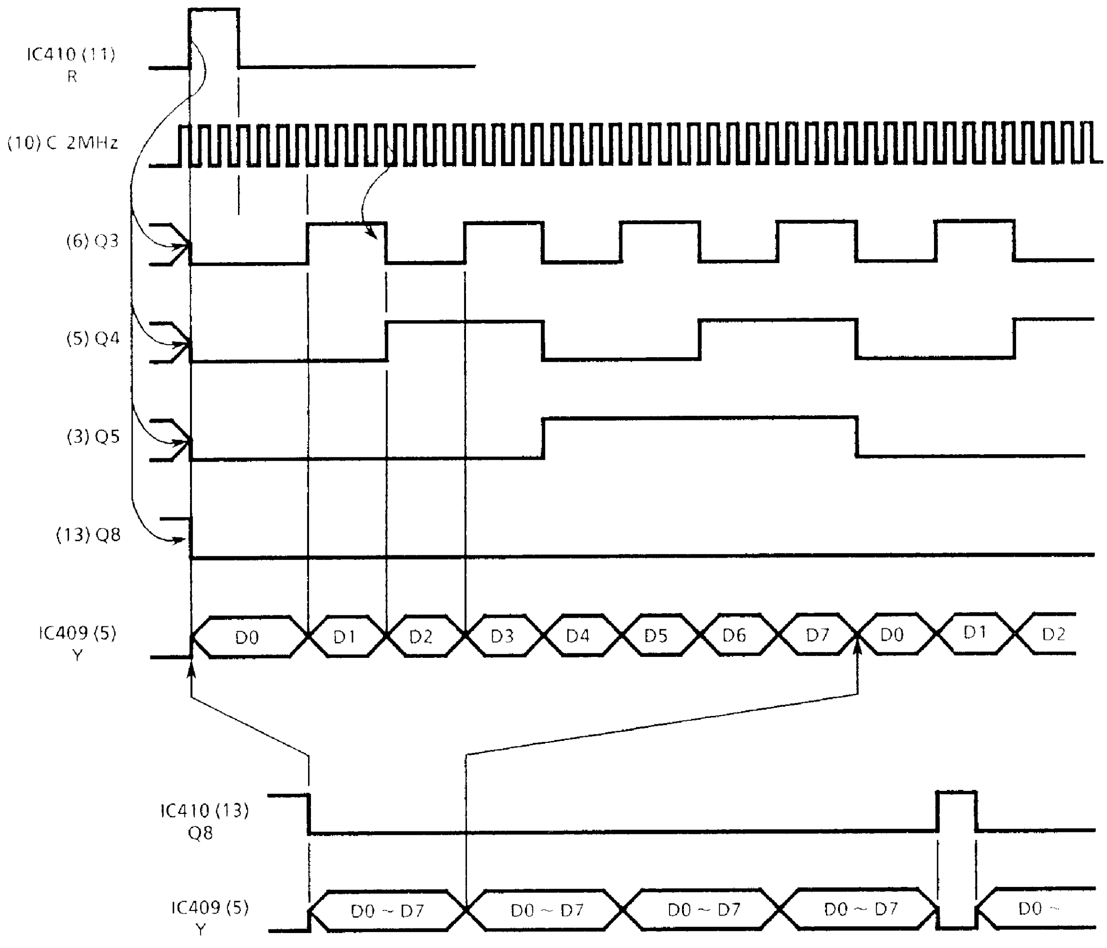

IC405 (12)
P23
IC410 (13)
Q8
VSYNC
64μS Data
IC411 (11)
IC411 (13)
BLANK 1
4(8) characters
( ): TEC-7300
SWEEP
SAWTOOTH
Actual display area
Blanking
End of sweep
1 chr
1 chr
1 chr
1 chr
Display spot

The data shown left modulates the beam as follows in case of TEC-7100/7200.

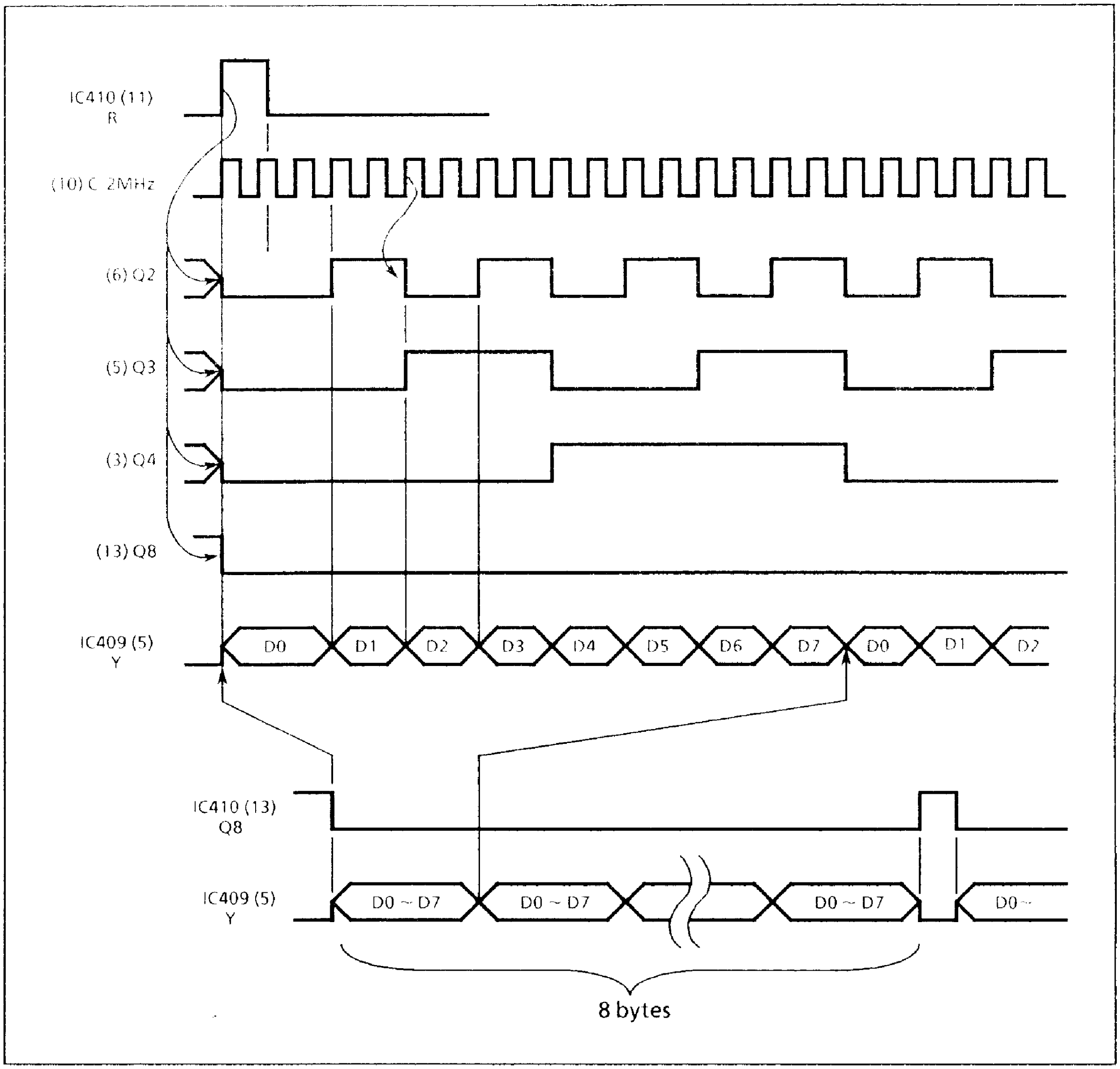
Character Data Decoding

Character data from the CRT CPU IC405 is converted from parallel data to serial data by the multiplexer IC409. Input selection of IC409 is controlled by Q3~Q5 (Q2~Q4: TEC-7300) of frequency divider IC410. The CPU supplies a clock pulse of 2MHz to IC410. When P23 IC405 becomes high, reset of IC410 is released. IC410 starts counting and IC409 outputs D0~D7. Although D0~D3 are directly sent to IC409, D4~D7 are latched by IC408. After IC409 outputs D0~D3 at Y, Q5 becomes high to latch D4~D7 in IC408. While IC410 outputs D4~D7, the next D0~D7 appears on the bus line.

Character Data Transfer Timing (One vertical scan for one character (TEC-7100/7200)


IC410 (11)
R
(10) C 2MHz
(6) Q3
(5) Q4
(3) Q5
(13) Q8
IC409 (5)
Y
D0
D1
D2
D3
D4
D5
D6
D7
D0
D1
D2
IC410 (13)
Q8
IC409 (5)
Y
D0 ~ D7
D0 ~ D7
D0 ~ D7
D0 ~ D7
D0 ~

Character Data Transfer Timing (One vertical scan for one character (TEC-7300)


IC410 (11)
R
(10) C 2MHz
(6) Q2
(5) Q3
(3) Q4
(13) Q8
IC409 (5)
Y
D0
D1
D2
D3
D4
D5
D6
D7
D0
D1
D2
IC410 (13)
Q8
IC409 (5)
Y
D0 ~ D7
D0 ~ D7
D0 ~ D7
D0 ~
8 bytes

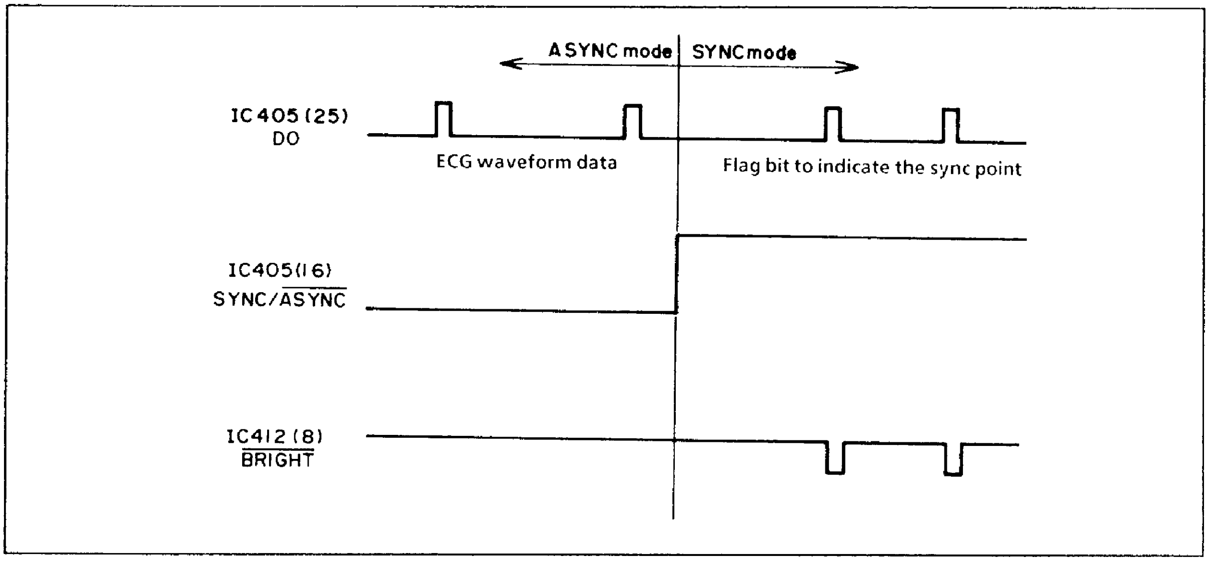
Waveform Data Transfer to CRT Driver

Digital ECG waveform data is transferred from the host CPU through RAM IC404. The data is D/A converted by IC406 and IC114-2 and sent to the CRT driver Y deflection amplifier as YSIG. In the waveform display mode, P25 of CRT CPU IC405 (14) is high so that VSYNC is blocked and BLANK1 is controlled by only P23. P23 is high between the end of one sweep and the beginning of the next one to blank the beam. CH1/CH2 at P24 of IC405(13) selects the display of waveforms. When CH1/CH2 is high, the waveform is displayed in the upper area.

QRS Sync Spot BRIGHT

In SYNC mode, the synchronized point is indicated as a spot on the QRS waveform. This spot is created by intensifying the brightness of the beam when BRIGHT is low. In SYNC mode, D1~D7 sent to IC406 are the ECG waveform data and D0 is flag bit to indicate the sync point. As D0 is also ECG waveform data in ASYNC mode, P27 of IC405 becomes low to block D0 appearing at BRIGHT.

Sync Spot Display Timing


ASYNC mode
SYNCmode
IC405(25)
D0
ECG waveform data
Flag bit to indicate the sync point
IC405(16)
SYNC/$\overline{\text{ASYNC}}$
IC412(8)
$\overline{\text{BRIGHT}}$

Peak-bottom Processing

As 1/3 of the ECG data transferred from the host CPU is used for display, peak-bottom processing is performed in software to display the peak of the steep QRS waveform accurately. The ECG waveform is A/D converted every 2 msec. In peak-bottom processing, one of the three points is selected every 6 msec. One block is comprised of three individual data. The individual data of two time-sequential blocks is compared. From each block the data with the greatest difference in amplitude from that of the data selected in the inmediately preceding block is then selected.

CRT CPU Pin Description

Pin No.	Symbol	I / O	Function
1	Vss	---	Ground
2	XTAL	---	Not used
3	EXTAL	I	Clock 8 MHz
4~5	MP0~MP1	I	Operation mode selection
6	RES	I	Reset — 0 : Resets the CPU when the power is turned on
7	STBY	I	Not used
8	NMI	I	Non-maskable interrupt — Negative edge causes restart from start address. HALTCRT is sent to this input from the host CPU.
9	P20	O	VSSET (Vertical scan set) — 0 : Until vertical scan reaches to character display area starting from the left end.
10	P21	O	HSYNC (Horizontal synchronization)
11	P22	O	WAVE / CHR — 0 : Waveform display, 1 : Character display
12	P23	O	Blanking — 1 : While blanking beam between the end and the start of sweep.
13	P24	O	CH1 / CH2 — 1 : Waveform is displayed on channel 1. 0 : Waveform is displayed on channel 2.
14	P25	O	WAVE / CHR — 0 : Character display, 1 : Waveform display
15	P26	O	LEADS OFF : Square waveform of 300 Hz is sent to the transmitter when the transmitter receives the signal from the main unit and an electrode connected to the main unit is detected.
16	P27	O	Sync mode — 1 : Sync mode
17~19	P50~P52	---	Not used
20	P53	I	HALTCRT — 0 : The CRT CPU is halted by the host CPU.
21~22	P54~P55	---	Not used
23	P56	I	CALDISP (Internal DIP SW setting) — 0 : A calibration waveform appears at the left end of the 2nd trace.
24	P57	---	Not used
25~32	P60~P67	I / O	D0~D7 — Data bus for the D / A converter
33	Vcc	I	Power — + 5 V
34~41	P47~P40	O	A15~A8 — Address bus

Pin No.	Symbol	I / O	Function
42	Vpp / OE	---	Not used
43~50	P17~P10	O	A7~A0 — Address bus
51~58	P37~P30	I / O	Data bus
59	P74	O	Bus available — 1 : The CRT CPU disconnects the bus when the CRT CPU halts.
60~61	P73~P72	---	Not used
62	P71	O	WR (Write) — 0 : Writes the data into the RAM.
63	P70	O	RD (Read) — 0 : Reads the data from the RAM
64	E	O	Clock pulse of 2 MHz for character data decoder.

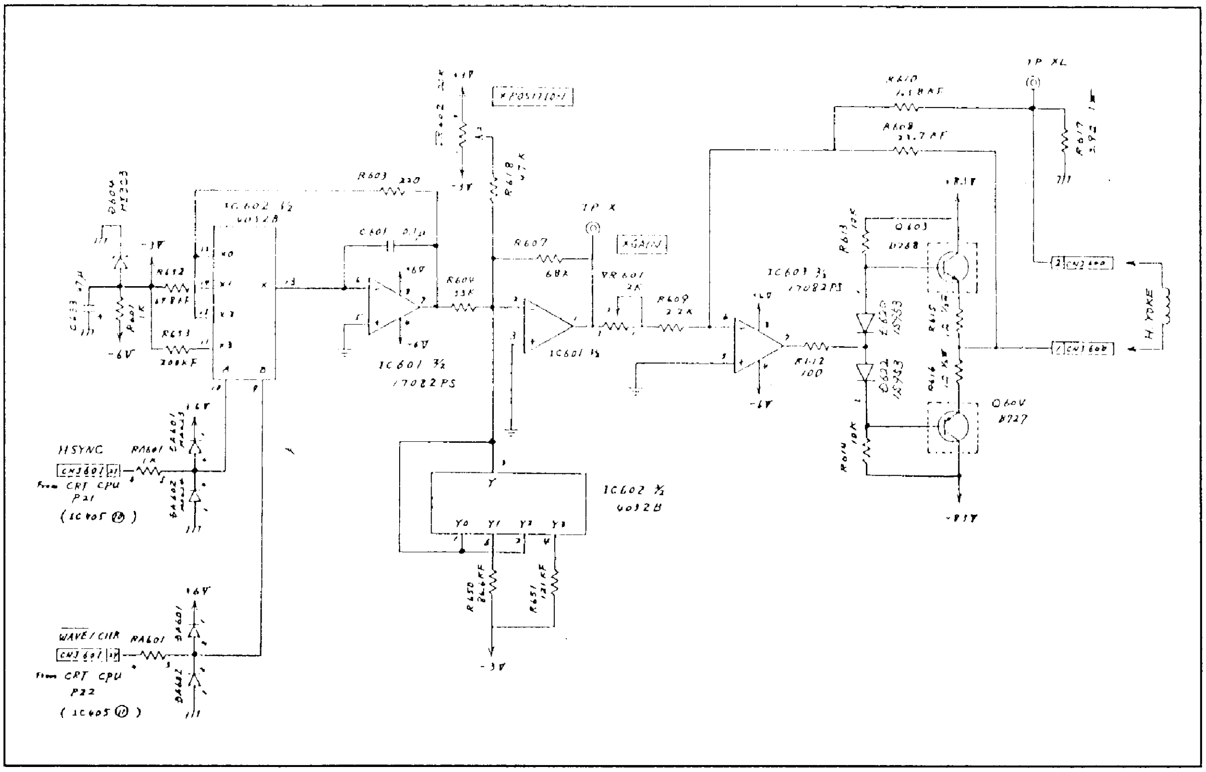
3-4 CRT Driver UP-7740

Outline

The CRT driver drives the horizontal, vertical and position yoke controlled by the signal sent from the CRT CPU to display the waveforms and characters.

The HSYNC controls a sawtooth waveform to drive a horizontal yoke for the horizontal sweep. The sweep speed, width and vertical position change according to the display mode of waveforms and characters. The display mode is controlled by the WAVE/CHR. The vertical deflection waveform also changes according to the display mode. In the waveform display mode, the YSIG is used as a vertical deflection signal. In the character display mode, the VSYNC controls a sawtooth waveform for the vertical scan and the BLANK controls beam on/off for modulation. The BLANK also blanks the beam between the end and start of both the horizontal and vertical sweep.

Horizontal Deflection Driver


X POSITION
R603 220
R618 47K
IC602 ½ 4052B
D604
C601 0.1μ
R607 68K
TP X
X GAIN
VR601 2K
R609 22K
R604 33K
R612
R613 200KF
R601 1K
C633 47μ
-6V
-3V
+6V
X0
X1
X2
X3
X
A
B
IC601 ½ 17082PS
IC603 ½ 17082PS
R612 100
D620 1S953
D622 1S953
R613 10K
R614 10K
R615
R616
Q603 D768
Q604 B727
+13V
-13V
R610 1.18KF
R608 21.7KF
TP XL
R617
CN3 606
H. YOKE
IC602 ½ 4052B
Y
Y0
Y1
Y2
Y3
R650
R651 121KF
HSYNC
RA601 1K
CN3601
From CRT CPU
P21
(IC605 ⑬)
DA601
DA602
WAVE/CHR
RA601
CN3 601
From CRT CPU
P22
(IC605 ⑪)

The HSYNC triggers the integrator IC601-2 to generate sawtooth waveforms. The horizontal deflection waveform changes according to the display mode controlled by the WAVE/CHR. The sweep width is determined by the amplitude of the sawtooth which is controlled by IC602-1. The sweep time is detemined by the HSYNC timing. The horizontal position is controlled by IC602-2. The relationship between control signals and outputs is as follows.

Horizontal Sawtooth Control IC602

Display mode	Control		Output	
	A (HSYNC)	B (WAVE/CHR)	X	Y
Blanking	0	x	X0 / X2	Y0 / Y2
Waveform	1	0	X1	Y1
Character	1	1	X3	Y3

x : Irrelevant

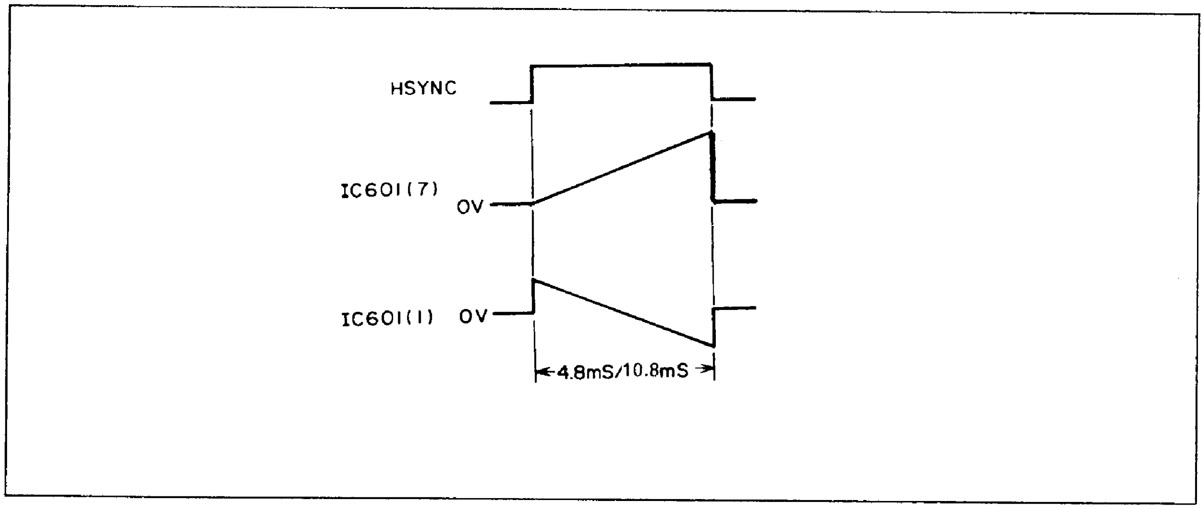
Sweep Speed Control

The sweep speed is controlled by the charging speed of the integrator IC601-2. In the character display mode, the WAVE/CHR is high. When the HSYNC becomes high, −3V is connected to C601 through R653 and integration starts. The charging speed is determined by R653 and C601. When the HSYNC becomes low, C601 is discharged through R603. In the waveform display mode, the WAVE/CHR is low. Therefore the charging speed is determined by R652 and C601.

Horizontal Position Control

The offset voltage controlled by IC602-1 is added to the sawtooth to shift the level so that the center of the sawtooth and the level of blanking period become 0V. This offset voltage addition is controlled by the HSYNC and WAVE/CHR. In the character display mode, when the HSYNC is low, −3V is connected to IC601-1 through R651. The offset of −3V×(R607/R651) is added to IC601-1. In the waveform display mode, the offset of −3V×(R607/R650) is added. These offset voltages are added only when HSYNC is high. The horizontal position for both the waveforms and characters is adjusted by VR602.

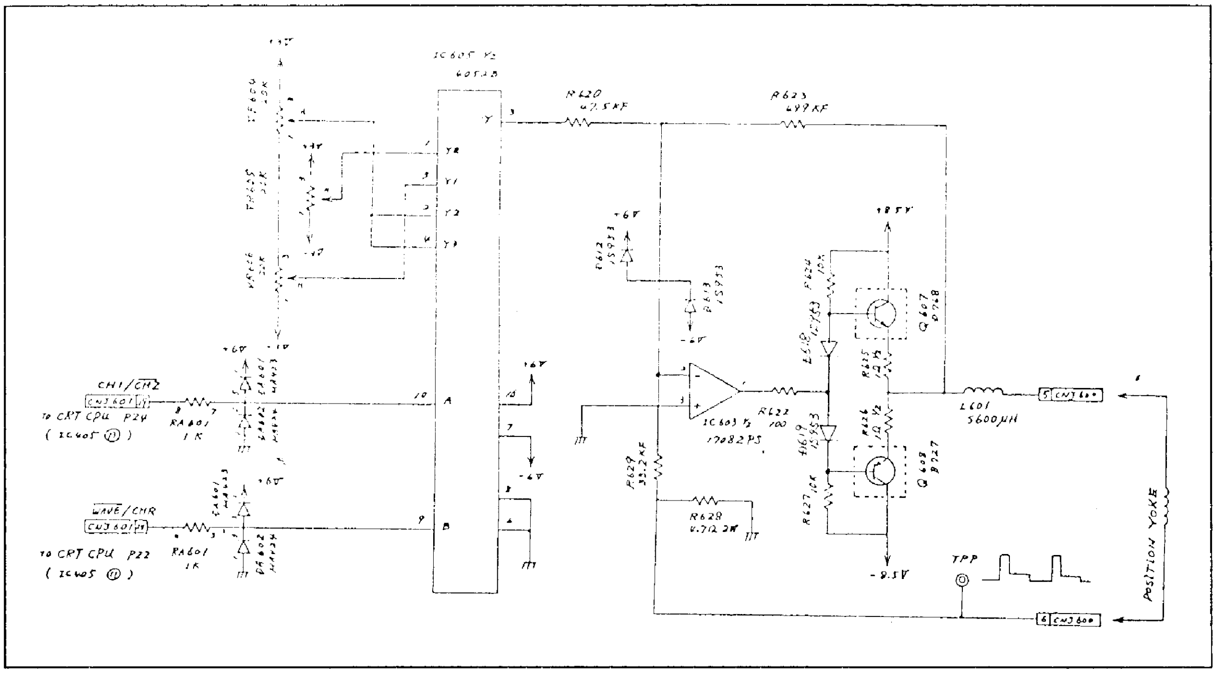
Horizontal Sweep Sawtooth



Driver

When the input voltage of IC603-2 becomes a positive maximum, the output becomes negative, the base voltage of Q603~604 decreases, the emitter voltage decreases and becomes negative, current flows from CNJ600-2 to CNJ600-1 through the yoke, and the sweep is initiated at the left end of the screen. IC603-2 has two feedback loops. The main feedback is through R610, and the yoke is delayed due to the inductance of the yoke. The feedback through R608 compensates this delay to return the beam quickly. Then the horizontal deflection width is adjusted by VR601.

Vertical Position Control


IC605 ½
4052B
R620
47.5KF
R623
499KF
Y
YR
Y1
Y2
Y3
VR604
VR605
VR606
+6V
-6V
CH1/CH2
CNJ601
TO CRT CPU P24
(IC405 ⑬)
RA601
1K
A
B
WAVE/CHR
TO CRT CPU P22
(IC405 ⑪)
DA601
DA602
D612
1S953
D613
1S953
IC603 ½
17082PS
R622
100
+8.5V
-8.5V
R624
10K
D618
D619
1S953
Q607
D768
Q608
B727
R625
1Ω ½
R626
1Ω ½
R627
10K
R629
33.2KF
R628
4.7Ω 2W
L601
5600µH
CNJ600
TPP
POSITION YOKE

This circuit controls vertical positions for characters and ECG of channel-1 and -2. Current for the position yoke is controlled by CH1/CH2 and WAVE/CHR sent from the CRT CPU. The relationship between control signals and outputs is shown below.

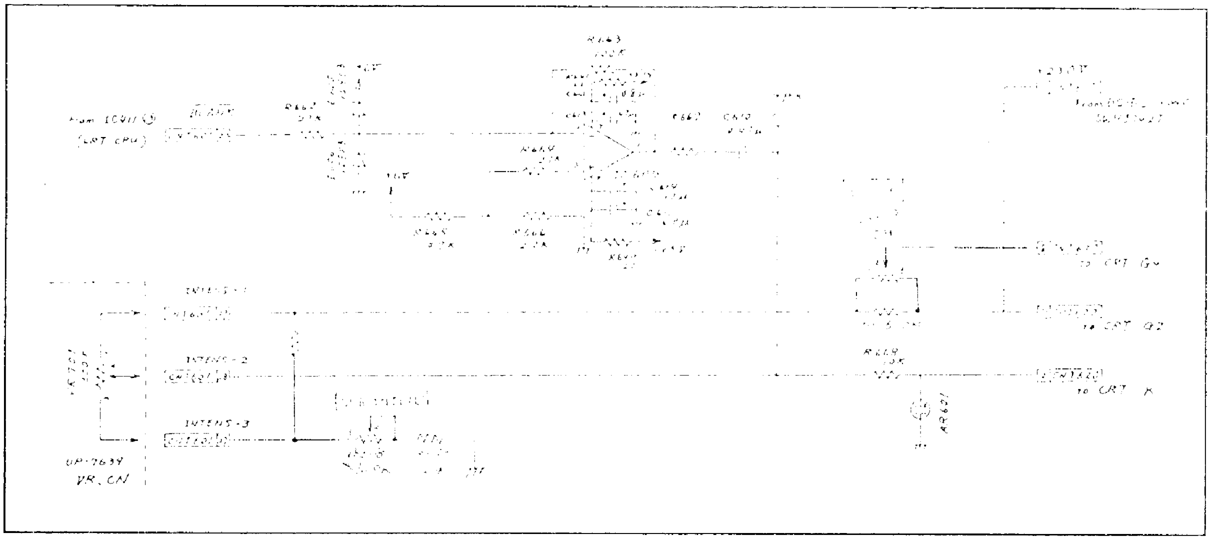
Position Control IC605

Control		Output	Display mode
A (CH1/CH2)	B (WAVE/CHR)		
X	1	Y2 / Y3	Character
1	0	Y1	Waveform CH-1
0	0	Y0	Waveform CH-2

X : Irrelevant

For example, when channel-1 is selected, negative voltage is applied to IC603-1 (2), the output increases, the base voltage of Q607~608 increases, the emitter voltage increases, the yoke current increases and the baseline position goes up. Feedback through R629 is delayed by the inductance of L601 and the yoke. Feedback through R623 compensates for this delay.

Blanking

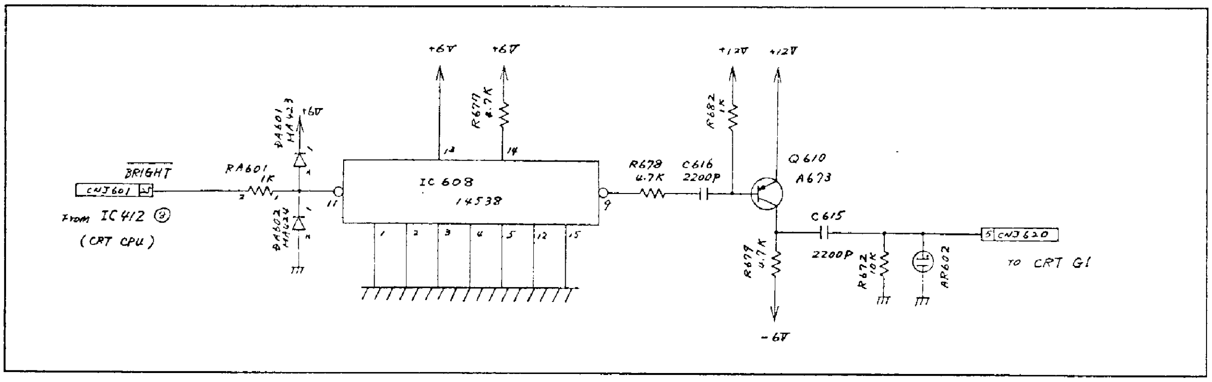

From IC411
(CRT CPU)
BLANK
R662
R663
R664
R665
R666
C610
+230V
to CRT G4
INTENS-1
to CRT G2
INTENS-2
R668
to CRT K
AR601
INTENS-3
VR701
UP-7639
VR, CN

The BLANK controls the cathode voltage to turn on/off the beam. IC604 amplifies the BLANK (0 or +5V) to provide a saturated output with an offset of +1.9V. The cathode voltage of +230V divided by R674~676, R671, R673 and VR701. When the BLANK is low, the cathode voltage increases to turn off the beam.

VR608 adjusts the adjusting range of VR701 for intensity control.

VR609 adjusts the voltage of G4 for focus control.

QRS Sync Spot


BRIGHT
CNJ601
From IC412 ⑨
(CRT CPU)
RA601
1K
DA601
MA4.3
+6V
DA602
MA4.3
IC 608
14538
+6V
+6V
R677
4.7K
14
14
11
9
1
2
3
4
5
12
15
R678
4.7K
C616
2200P
+12V
+12V
R682
1K
Q610
A673
C615
2200P
R679
4.7K
R672
10K
AR602
CNJ620
TO CRT G1
-6V

The QRS synchronized point is displayed as a spot on the QRS waveform. When the BRIGHT becomes low, the monostable multivibrator IC608 generates a low pulse and the grid voltage increases to intensify the beam brightness. Stray capacity narrows the pulse width of IC608.

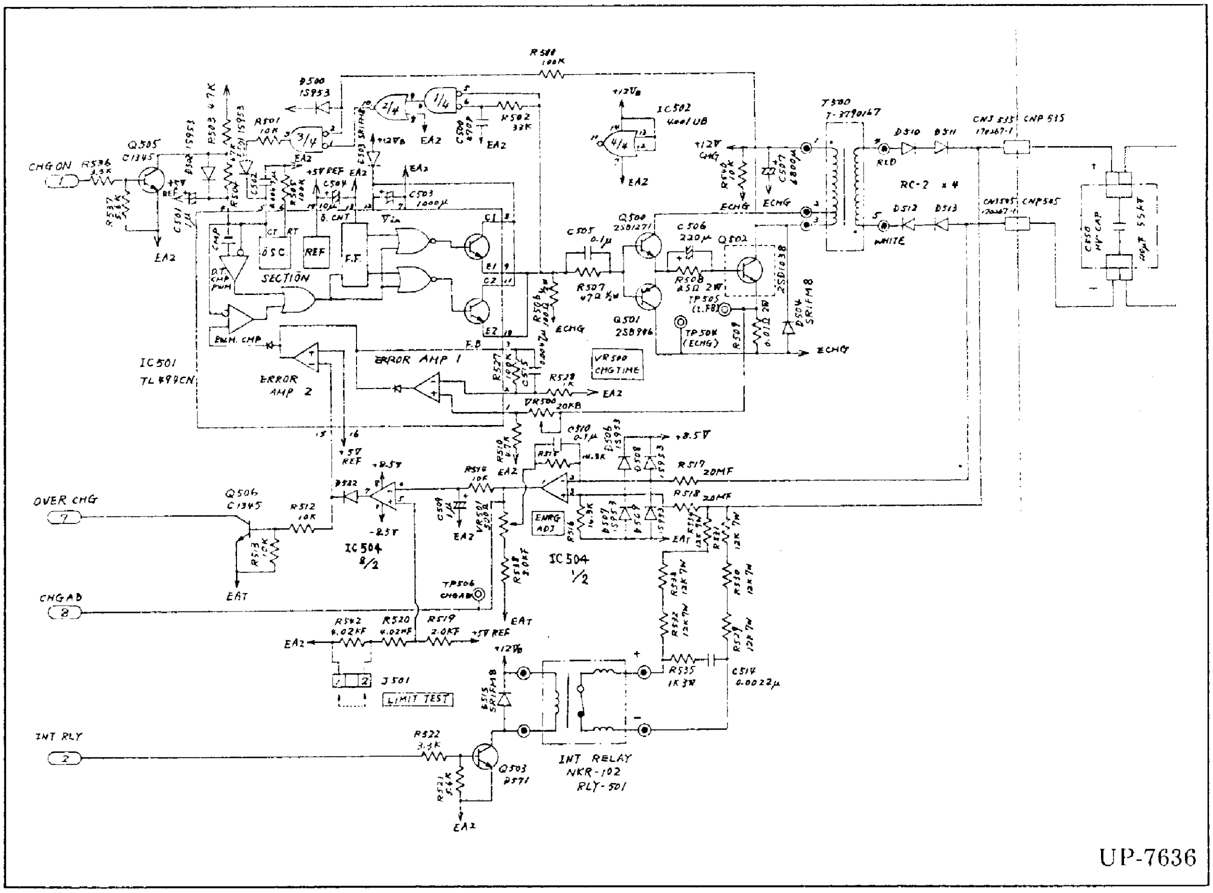
3-5 High Voltage Board UP-7636/7851

Outline

This unit generates a high voltage to charge the energy and controls charging and discharging. The charge energy is monitored by the host CPU through the A/D converter. For safety, the charged energy is also monitored by the comparator to avoid overcharge. The integration of the discharge current change measured when the energy is discharged is sent to the host CPU to calculate the TTR (Transthoracic Resistance) and delivered energy (TEC-7200/7300 only).

Switching Control

Switching Control, Charge Energy Monitor and Internal Discharge


CHG ON
OVER CHG
CHGAD
INT RLY
Q505 C1345
IC501 TL494CN
OSC
REF
F.F
SECTION
ERROR AMP 1
ERROR AMP 2
PWM. CMP
D.T CMP
Q500 2SD1271
Q501 2SB946
Q502 2SD1038
T500
D510 D511 D512 D513
RED
WHITE
RC-2 x 4
CNJ 515 CNP 515
CN1545 CNP545
HV CAP
ECHG
EA2
EAT
+12VB
+5V REF
+8.5V
-8.5V
IC502
IC504 1/2
Q506 C1345
VR500 CHG TIME
ENRG ADJ
TP505
TP504 (ECHG)
TP506 CHGAD
J501 LIMIT TEST
INT RELAY NKR-102 RLY-501
Q503 B571
UP-7636

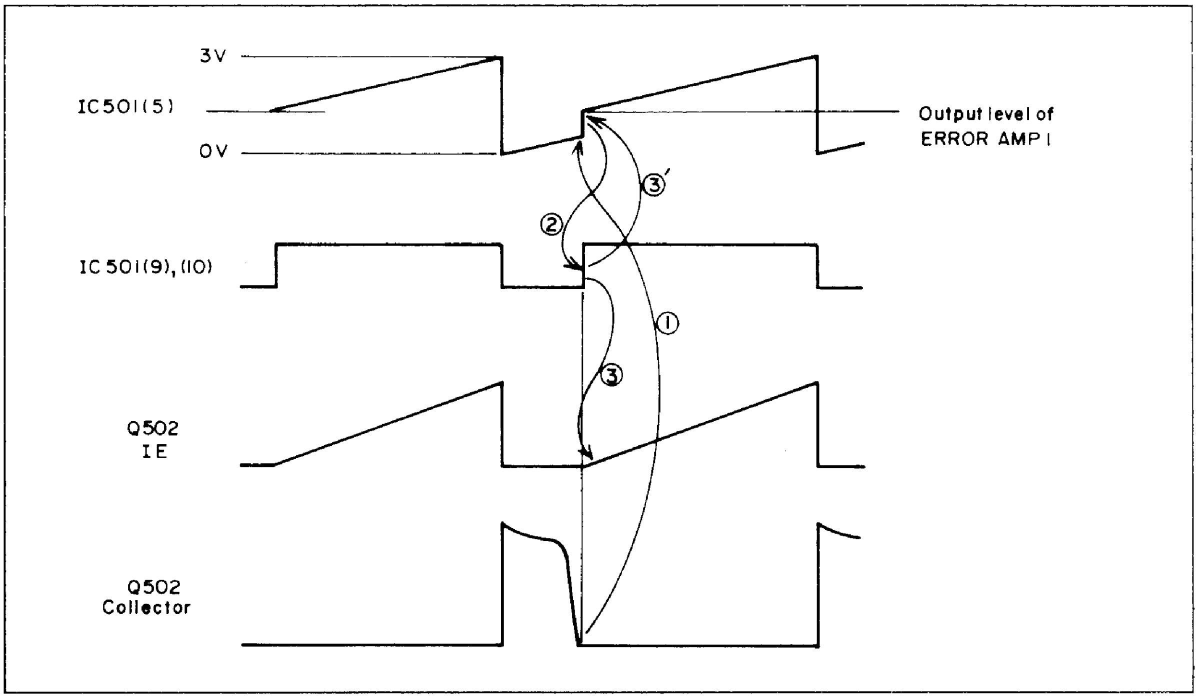
The switching regulator controller IC501 controls the switching of the transistor Q500~Q502. IC501 comprises the oscillator, dead time comparator, PWM comparator, two error amplifiers, flip-flop, output control and reference voltage generator. Energy charging start/stop is controlled by the dead time comparator and the error amplifier-2. The error amplifier-2 protects the circuit from overcharging. The error amplifier-1 controls the output pulse width to regulate the output current. The dead time and PWM comparators compare the level of the sawtooth waveform generated by the built-in oscillator with the level of the control signal.
When not charging, the CHGON is low, IC501 (4) is high, the dead time comparator has a constantly high output as the control input level is higher than the sawtooth input level, and the output transistors are turned off. When the charge button is pressed, the CHGON becomes high, (4) becomes low gradually due to C501. When the control input level becomes lower than the peak level of the sawtooth, the dead time comparator outputs pulses to turn on/off the output transistors for charging. Then (4) continues to become lower, when the control input level becomes lower than the bottom level of the sawtooth, the dead time comparator constantly outputs low. At this time switching is controlled by the PWM comparator.

The PWM comparator compares the sawtooth with the output of the error amplifiers. The pulse width of the PWM comparator is controlled by the output level of the error amplifier-1. The output current through R509 is converted into the voltage. The error amplifier-1 provides the mean voltage to the PWM comparator. When the current increases, the turn-on time of the output transistors is shortened and the current is regulated.

When the output of IC501 (9)/(10) is high, Q500 and Q502 turn on and the current flows through T500. The current is a sawtooth waveform due to the inductance of T500. The sawtooth at IC501 (5) becomes 0V when it reaches +3V, Q502 turns off, the collector potential of Q502 becomes high and the energy stored in the primary winding is transferred to the secondary winding. After one pulse charging, the collector potential of Q502 becomes 0V.

① The collector of Q502 is 0V. As Q502 is turned off, IC502 (10) is low. IC502 (3) outputs high, C502 is charged and the level of IC501 (5) goes up.
② The level of IC501 (5) exceeds the output level of the error amplifier-1 and IC501 (9)/(10) becomes high.
③ The current of Q502 increases.
③' The output of IC501 (9)/(10) becomes high, IC502 (3) becomes low, D501 turns off and the sawtooth slope is controlled by the internal oscillator.

High Voltage Switching Timing



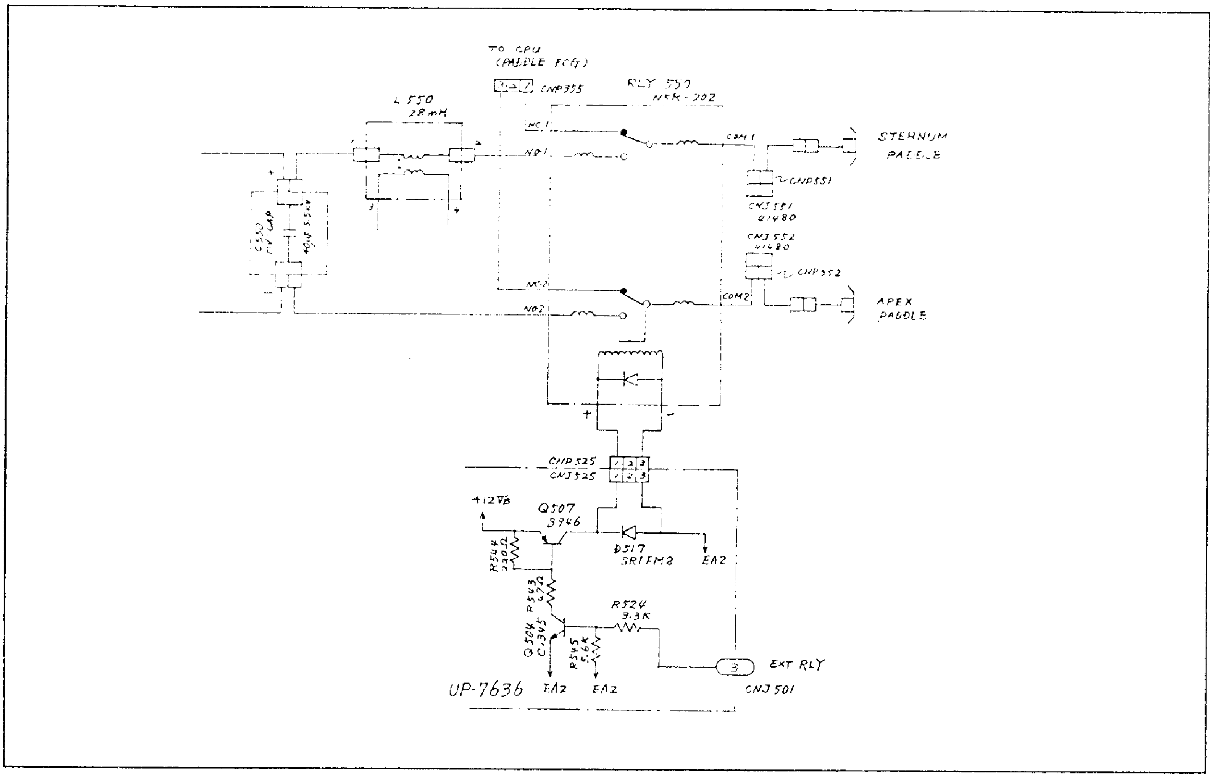
Charge Energy Monitor

IC504-1 divides the charged voltage in C550 by 1/1250 and the resulting voltage is sent to the A/D converter of the ECG/CPU as the CHGAD. IC504-2 also monitors the charged voltage for safety. If the circuit is faulty and the voltage of C550 exceeds 5 kV, the CHGAD at TP506 becomes +4V, IC504-2 saturates to negative, D522 turns off, the control input of the error amplifier becomes 0V, the error amplifier's output is high, the PWM comparator's output is constantly high and charging stops. At the same time, Q506 turns off, the OVERCHG becomes high (pulled up in the ECG/CPU), the host CPU makes the CHGON low, discharges the energy internally and displays "ERROR4" on the CRT.

Internal Discharge

When the energy is not charged, the INTRLY is low, Q503 turns off and the internal discharge relay RLY501 is closed and C550 is not charged. When the energy is charged, RLY501 opens. When discharging the energy, internally in the same manner as above, RLY501 is closed and the charged energy is consumed through R529~534. D515 protects Q503 from damage due to the counter-electromotive force of the inductance of RLY501 when Q503 turns off.

External Discharge


TO CPU
(PADDLE ECG)
CNP355
RLY 550
NFK-202
L 550
28 mH
NC1
NO1
COM1
STERNUM
PADDLE
CNP551
CNJ551
Q1480
CNJ552
Q1480
CNP552
C550
HV CAP
40μF 5.5kV
NC2
NO2
COM2
APEX
PADDLE
+
−
CNP525
CNJ525
+12VB
Q507
3946
R544
220Ω
D517
SR1FM8
EA2
R543
47Ω
R524
3.3K
Q504
C1345
R545
5.6K
EXT RLY
CNJ501
UP-7636
EA2
EA2

The charged energy is discharged to the paddles by the relay. The relay RLY550 is usually set to the paddle lead ECG position. When the EXTRLY becomes high, Q504 and Q507 turn on, RLY550 connects the paddle to C550 to discharge energy. 300 msec. later, EXTRLY becomes low. D517 protects Q507 from damage due to the counter electromotive force of inductance of RLY550 when Q507 turns off.

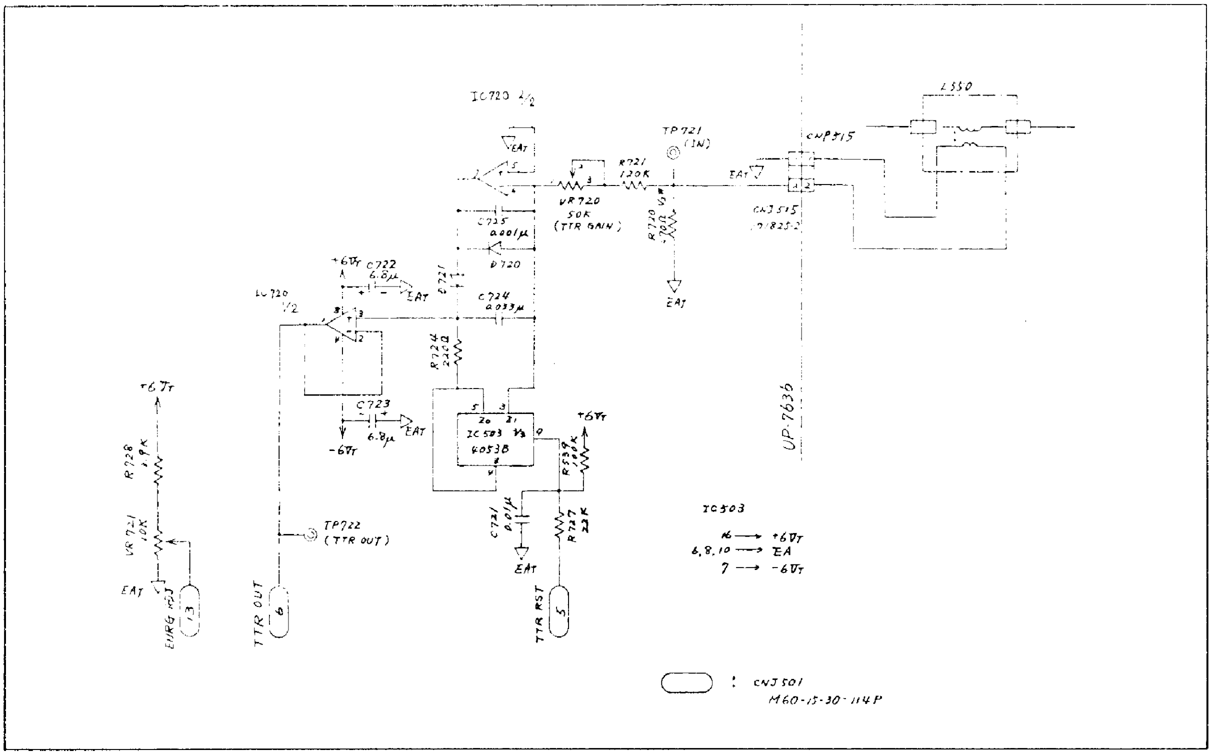
A part of the discharged energy is consumed by the internal resistance of 9Ω in the circuit. The energy selector indicates the energy level for the load of 50Ω. Therefore the indicated energy level is :

(Indicated energy) = (Stored energy) × 50/(50 + 9)

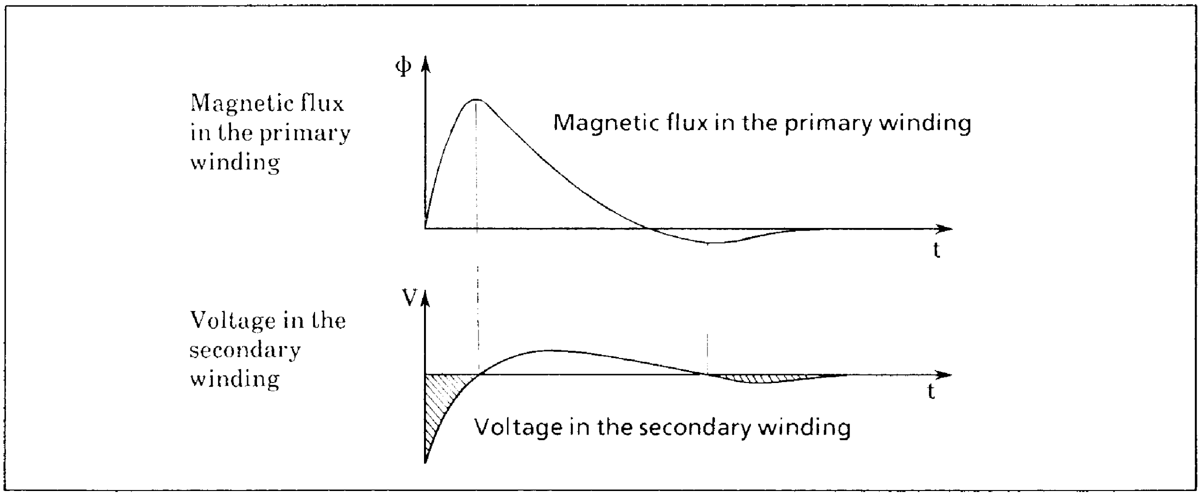
When the transthoracic resistance is RΩ :

(Delivered energy) = (Stored energy) × R/(R + 9)

TTR Detection (Not used in TEC-7100)

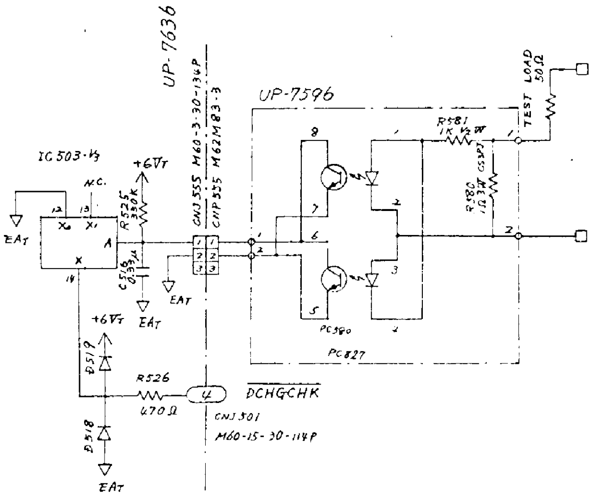

IC720 2/2
TP721 (IN)
CNP515
L550
EAT
R721 120K
VR720 50K (TTR GAIN)
C725 0.001μ
D720
D721
R720 470Ω
CNJ515 171825-2
+6VT
C722 6.8μ
IC720 1/2
C724 0.033μ
R724 220Ω
C723 6.8μ
-6VT
IC503 1/3 4053B
R539 100K
C721 0.01μ
R727 22K
R728 3.9K
VR721 10K
TP722 (TTR OUT)
EURG ADJ
13
TTR OUT
6
TTR RST
5
UP-7636
IC503
16 → +6VT
6, 8, 10 → EA
7 → -6VT
: CNJ501 M60-15-30-114P

When the energy is discharged externally, the change of magnetic flux in the primary winding of L550 induces the voltage in the secondary winding, the negative voltage at the secondary winding is integrated, and the host CPU calculates the TTR and delivered energy according to the integrated value.



An integrator with a rectifier IC720-2 integrates this change of the negative area. When the input of IC720-2 is negative, D721 turns on and C724 is charged for integration. When positive, D720 turns on and C724 is not charged. The integrated value TTROUT is sent to the A/D converter of the ECG/CPU through the buffer amplifier IC720-1. The host CPU calculates the TTR and delivered energy. The TTRGAIN VR720 adjusts the integration value. The ENRGADJ at CNJ501 (13) is the reference for calculation. After discharge, the TTRRST becomes high to reset the integrator.

Discharge Test Detection


UP-7636
CNJ555 M60-3-30-134P
CHP555 M62M83-3
UP-7596
IC503-1/3
N.C.
+6VT
R525 330K
C516 0.33μ
EAT
X0
X1
A
X
12
13
14
R581 1K 1/2W
R580 1Ω 3W CS5P3
TEST LOAD 50Ω
PC580
PC827
D519
D518
R526 470Ω
4
DCHGCHK
CNJ501
M60-15-30-114P

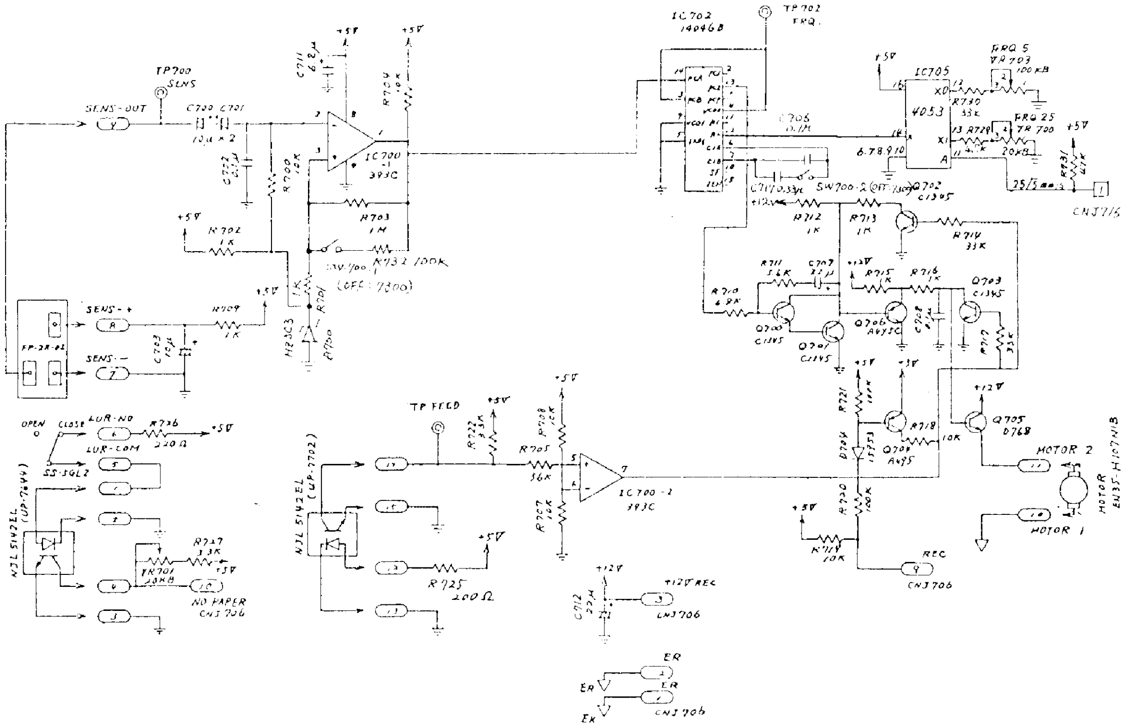
The host CPU recognizes that the energy is discharged to the test load by the DCHGCHK. When the energy is discharged to the test load, the photocoupler PC580 turns on and a low pulse is applied to the multiplexer IC503-1 to generate the low pulse DCHGCHK. C516 and R325 widens the pulse width.

This circuit of TEC-7100 checks whether the energy is discharged to the test load. This circuit and TTR detector of TEC-7200 check whether the proper amount of energy is discharged to the test load.

3-6 Motor Drive Control UP-7738

Outline

The paper feeding motor is controlled by the control signal from the host CPU. The rotation of the motor is regulated by the feedback from the rotation sensor. The opening of the head and the running out of paper are sensed and the signals are sent to the host CPU. For the thermal head operation, see the Data Transfer to Recorder section of 3-3-1 Host CPU.


TP700 SENS
SENS-OUT
IC700-1 393C
R703 1M
R732 100K
SW700
IC702 14046B
TP702 FRQ.
IC705 4053
FRQ 5 VR 703 100KB
FRQ 25 VR 700 20KB
CN3715
Q702 C1345
Q703 C1345
Q704 C1345
Q705 D768
Q706 A495C
Q707 C1145
SENS-+
SENS--
FP-2R-01
TP FEED
IC700-2 393C
R725 200Ω
MOTOR 2
MOTOR 1
MOTOR EN35-H107N1B
REC
CN3706
OPEN
CLOSE
LVR-NO
LVR-COM
R736 220Ω
SS-5GL2
R727 3.3K
TR701 10KB
NO PAPER
CN3706
NJL 5142EL (UP-7702)
NJL 5142EL
+12V REC
CN3706
ER
EX
+5V
+12V

Rotation Sensor

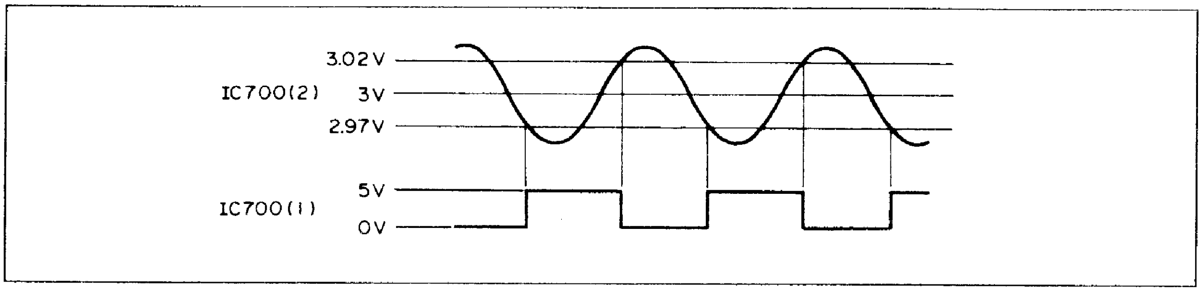
A power of +5V is supplied to the magnetic rotation sensor. R709 and C703 cut a high frequency noise. The sensor outputs a sine waveform of several hundreds mV. The frequency of the waveform corresponds to the rotation of the motor. IC700-1 is a hysteresis comparator with an offset of +3V by D700. R701 and R703 determine the hysteresis characteristic. When the potential of IC700-1 (2) is higher than (3), the output becomes 0V and the potential of (3) V(3) is:

$$V(3) = 3 - 3 \times R701/(R701 + R703)$$
$$\simeq 2.97V$$

When the potential of (2) decreases less than V(3), the output becomes +5V and the potential of (3) V(3) is;

$$V(3) = (5 - 3) \times R701/(R701 + R703) + 3$$
$$\simeq 3.02V$$

Waveform Shaping of Rotation Sensor



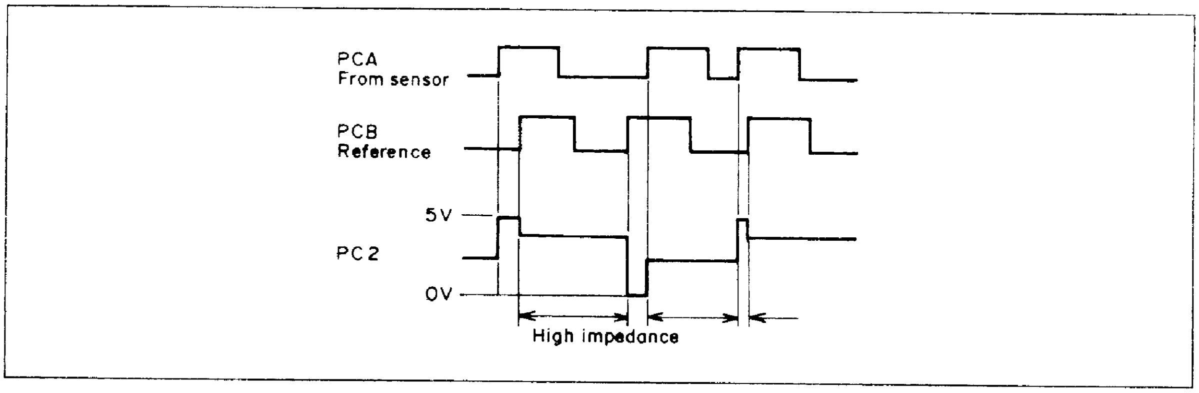
SW700-1 changes the gain of the amplifier. This switch is set to on for the TEC-7300 to increase the gain, as the output level of the sensor of the TEC-7300 is smaller than that of the TEC-7100/7200.

Phase Locked Loop

PLL IC702 compares the phase of the sensor signal PCA and the reference signal to regulate the rotation of the motor. When the motor rotates faster than specified, the advanced phase generates the positive level as shown below.

The frequency of the reference signal PCB is determined by the resistors connected to IC702 (12) and the capacitors connected to IC702 (6) and (7). The frequency is 294.8Hz in the TEC-7100/7200, and 1178.9Hz (25mm/s) or 235.8Hz (5mm/s) in the TEC-7300. Analog switch IC705 selects the frequency of the reference signal with the paper speed select signal 25/5mm/s. In the TEC-7100/7200, this select signal is fixed too high.

PLL Phase Comparison Timing



Integrator

R710~712 and C707 smoothen the output of IC702. When the motor rotates faster than specified, IC702's output is high, the base potential of TR700 increases, the potential of the collector of TR701 decreases, the potential of the emitter of TR706 and 705 decreases and the motor rotation is slowed. In contrast, when the motor rotates more slowly, the rotation is accelerated in the opposite manner.

Start / Stop Control

The REC from the host CPU controls the start/stop of the motor. When the REC is low, TR704 turns on, TR702~703 turn on, and TR705 turns off to stop the motor. When the REC is high, the motor runs.

Paper Feed Control

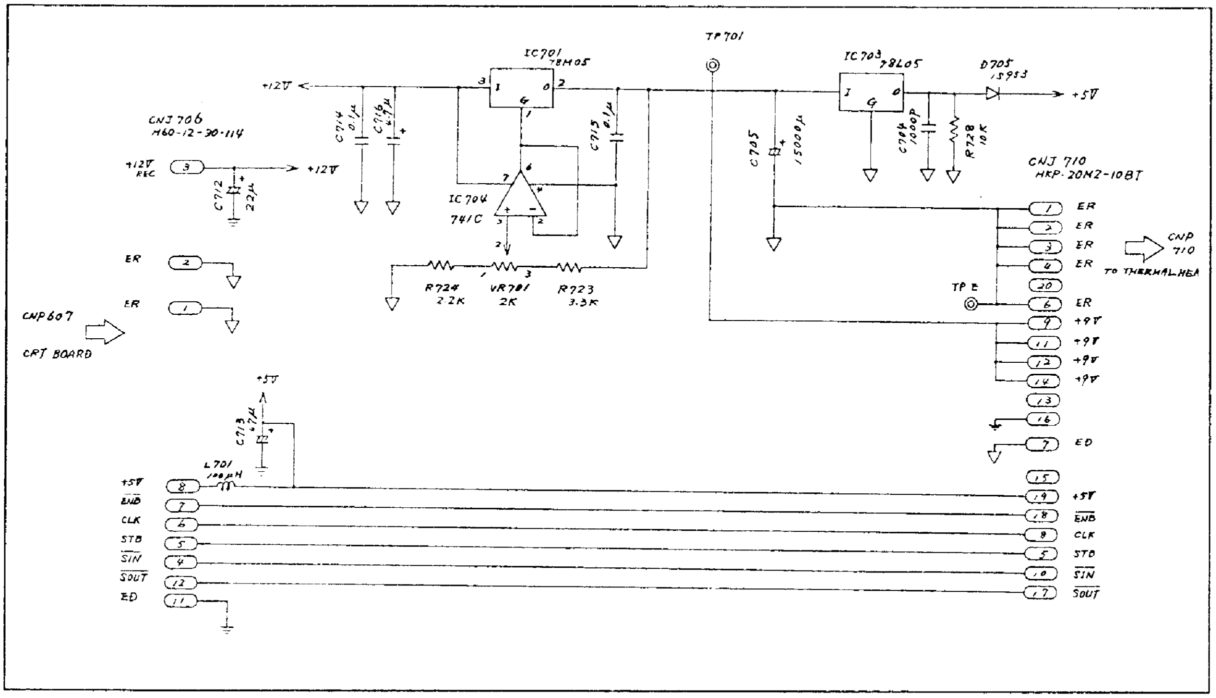
Paper feed lever action is sensed by the photo-reflector comprised of an LED and a sensor. The paper feed lever is linked to the reflector which moves together with the lever position. The reflector is usually positioned so that the light emitted from the LED does not reach the sensor. When the sensor does not receive the light, (14) and (15) of CNJ700 are open, the open collector comparator IC700-2 turns off and the start/stop is controlled by the REC. When the paper feed lever is pressed down, (14) and (15) are on, IC700-2 turns on, TR702~703 turn off regardless of the REC status, TR705 turns on and the motor runs.

Running Out of Paper

When the thermal head is not set or the paper is used up (or not loaded), a message is displayed on the CRT and the recording is stopped.

The micro-switch SS-5GL2 opens/closes together with the head. When the head is set to the recording position, the switch closes. The photo-reflector in UP-7644 senses the paper status. When the paper is loaded and the head is set, the light is reflected with the paper and the output NOPAPER becomes low. The NOPAPER is sent to the host CPU.

Power Supply


IC701
78M05
+12V
TP701
IC703 78L05
D705
1S953
+5V
CNJ 706
H60-12-30-114
C714 0.1μ
C716 4.7μ
C715 0.1μ
C705 15000μ
C704 1000P
R728 10K
+12V REC
+12V
C712 22μ
IC704
741C
CNJ 710
HKP-20M2-10BT
ER
R724 2.2K
VR701 2K
R723 3.3K
CNP 710
TO THERMAL HEA
TP E
CNP607
CRT BOARD
+9V
ED
+5V
C713 47μ
L701 100μH
+5V
END
CLK
STB
SIN
SOUT
ED

A regulated voltage of +9 and +5 is supplied from +12V. Although IC701 itself is a regulator for +5V, IC704 boosts the common potential of IC701 to provide +9V. As the current capacity of IC701 is not enough for driving all heat elements, C705 supplies the current. To avoid a malfunction caused by charged C705 when the power is turned off, +5V is turned off after +9V is turned off by connecting IC703 to the output of IC701. The data and control signals for the thermal head are transferred from the host CPU to the head through this board.

3-7 Power Unit SC-701V

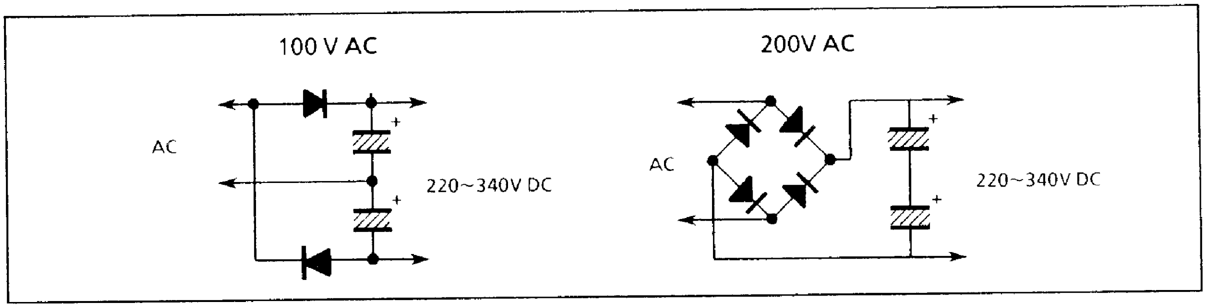
Outline

The switching regulator supplies the DC power to each unit from the AC source or the battery. The battery charger controls the charging voltage in the cycle or trickle mode.

AC Power Supply

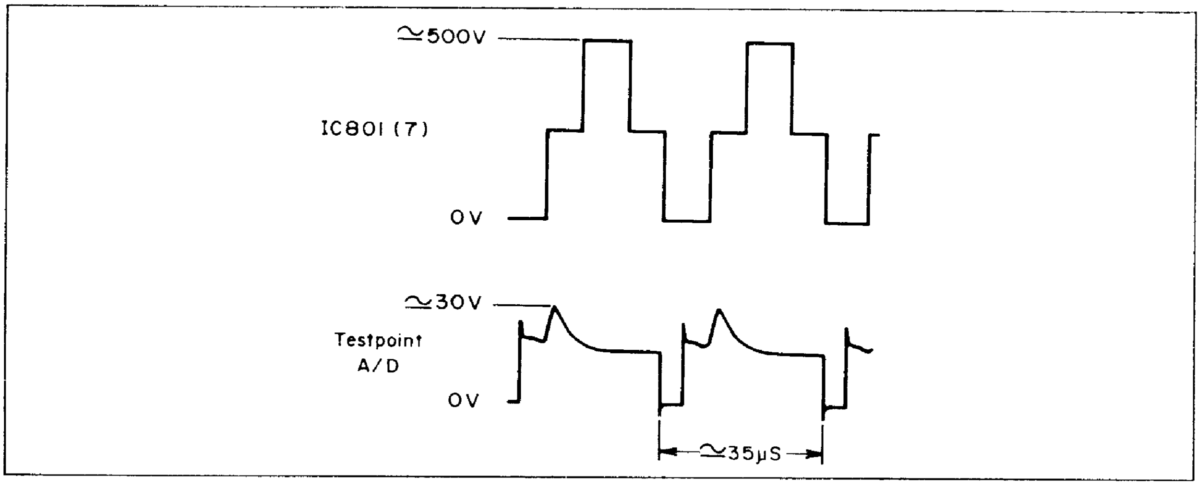
The line filter CN801, L801~802 and C801~802 prevent the switching noise from interfering with external instruments connected to the AC line. The thermistor TH801~802 protects the circuit from a rush current. When the power is turned on, the impedance of the thermistors is high to impede a rush current. In steady state, the impedance decreases due to the temperature increase. The selector P802 and J802~803 select the voltage of the AC power source of 100V (90~135V) and 200V (180~265V). In 100V position, the circuit becomes the voltage doubler rectifier. In 200V position, the circuit becomes the bridge rectifier as shown below.

Rectifier Selection



AC/DC Switching Control

The switching regulator IC801 is powered by Q801 to initiate an oscillation when the power is turned on and by T801 through D807~808 in steady state. IC801 switches Q804~805 and Q802~803 alternately to chop the power supply voltage which appears across C803 and C804 in the half-bridge method. The output voltage is regulated by PWM method by the feedback voltage to IC801 (12). When IC801 (7) is low, Q805 turns on, Q803 turns on through T804, the voltage across C804 is chopped and the pulses are transferred to the secondary winding circuit through T801.



Relay Control

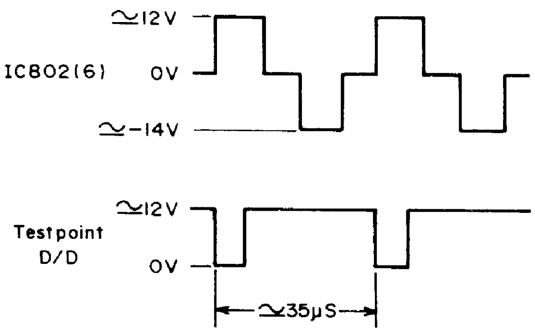
RY801 selects the power source of AC or the battery. RY802 turns on/off the power. When the AC source is available, the anode of D810 is high, Q806 turns on and the AC is selected. The signal AC of J804 (18) also becomes high and is sent to the host CPU. When the signal AC is low, +12VB of J804 (19) is A/D converted and monitored as the battery level by the host CPU. When the battery's level is lower than the operating voltage, the host CPU makes the BATOFF of J804 (17) high. RY802 is controlled by the POWER (from the energy selector), BATOFF, and AC of IC803 (12). The logic for RY802 is shown below.

Power on/off and AC/Battery Relay Control

POWER J804 (20)	1	0	0	0	0	0: Power on
IC803 (12)	X	0	0	1	1	1: AC is available
BATOFF J804 (17)	X	1	0	0	1	1: Battery is off
AC/BAT selector RY801	BAT	BAT	BAT	AC	AC	-----
Power on/off RY802	OFF	OFF	ON	ON	ON	-----

DC/DC Switching Control

Q807~808 switched by IC802 chops the rectified voltage. The pulse width of the chopped waveform regulates the output voltage by a feedback of +5V to IC802 (12). When the power on/off relay closes, the power is supplied through D815 to IC802 and an oscillation starts. Pulses transferred through T802 are rectified to provide ±6V, ±8.5V, +5V, +12VREC, +12VCRT and +12VB. ±6V and +12VCRT are regulated by series regulators IC807~809 and +5V is regulated by a switching regulator IC802.

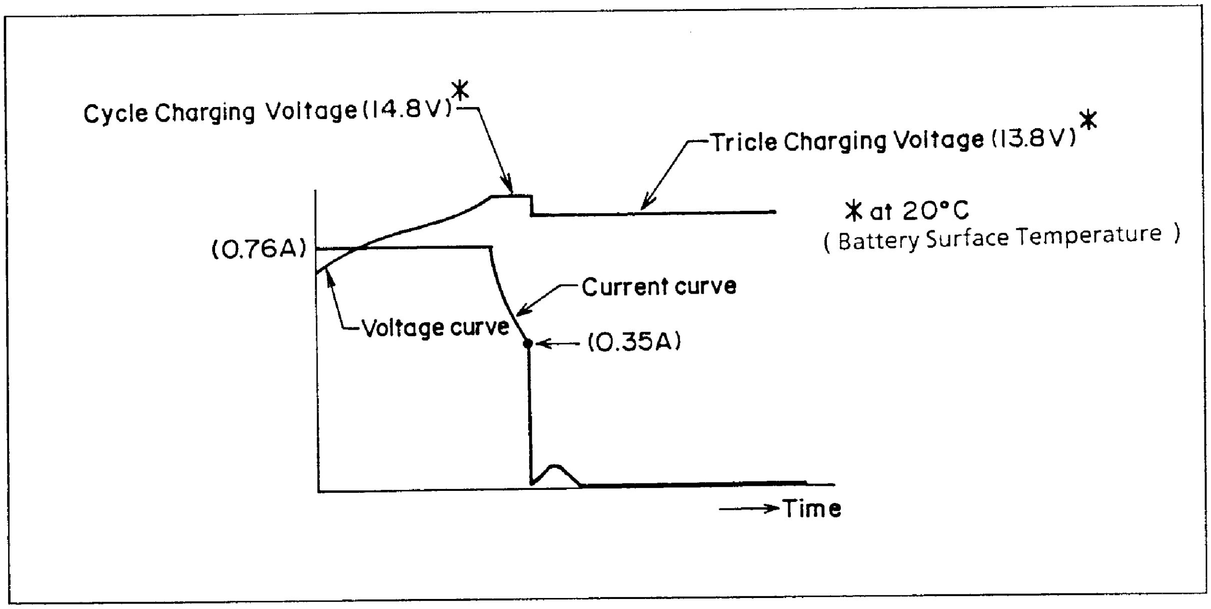


Battery Charger

The charger controls the charging mode of cycle and trickle. In the cycle mode, a large charging current rapidly charges the battery. When the battery is fully charged, the charging current is reduced to the minimum level to keep the battery fully charged.

The voltage regulator IC805 regulates the battery voltage in two steps. When charging starts (cycle mode), the regulation level is set to 14.8V (20°C). IC805 supplies a limited current of 760 mA to increase the voltage. The voltage across R849 is sensed by IC805 (2) and (3) to monitor the current level. When the battery level becomes the regulation level of 14.8V, the level is sensed by (4), the voltage is regulated and the charging current decreases gradually. When the charging current decreases to 350 mA, IC806 provides a low output to IC805 (5) to change the regulation level to 13.8V (20°C) and the current decreases to several mA for trickle charging. The regulation voltage depends on the battery surface temperature. The voltage in the tricle mode is 14.1V at 0°C, 13.8V at 20°C and 13.4V at 40°C.

Battery Charging Characteristics



Battery Charge Indication

(UP-7640)

When the AC power is supplied, the AC power switch is turned on, and the battery is in place in the defibrillator, the BATTERY lamp lights. The battery presence is detected by the switch connected to connector J808.

(UP-7720/7720G)

The BATTERY lamp lights in the cycle charge mode and goes off in the trickle mode. The lamp also goes off when the battery is not charged. The comparator IC10 monitors the battery charging current by the voltage across R884. When the charging current becomes less than approx. 25mA, the lamp goes off.

Section 4 SELF-CHECK

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4-3 Error 2, 3 .... 4.3
4-4 Error 4 .... 4.4

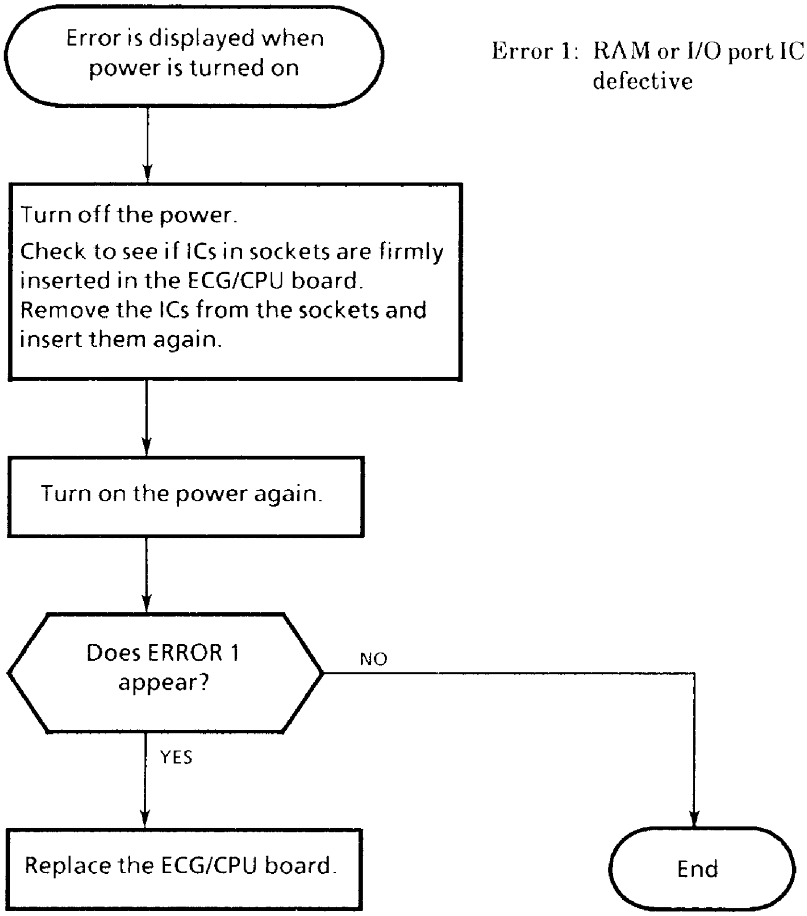
4-1 Introduction

The host CPU monitors the circuit operation and displays an error code on the screen when a malfunction is found according to the self-check program. Four types of error codes are provided.

When the power is turned on, RAMs and the I/O port are checked. If a malfunction is found, "ERROR 1" is displayed with an alarm for 3 sec. If no trouble is found "READY" is displayed.

When the high voltage circuit is faulty, error 2, 3 or 4 is displayed and the CPU inhibits the energy charging operation for safety. These error messages are stored in the memory of the timer IC, which is backed up by the battery. Therefore, once the message appears, charging is impossible even after the power is turned off and on again. However, this error message may appear due to noise or poor contact of the connector. First clear the error message in the memory as shown in later to eliminate such faulty error messages.

4-2 Error 1

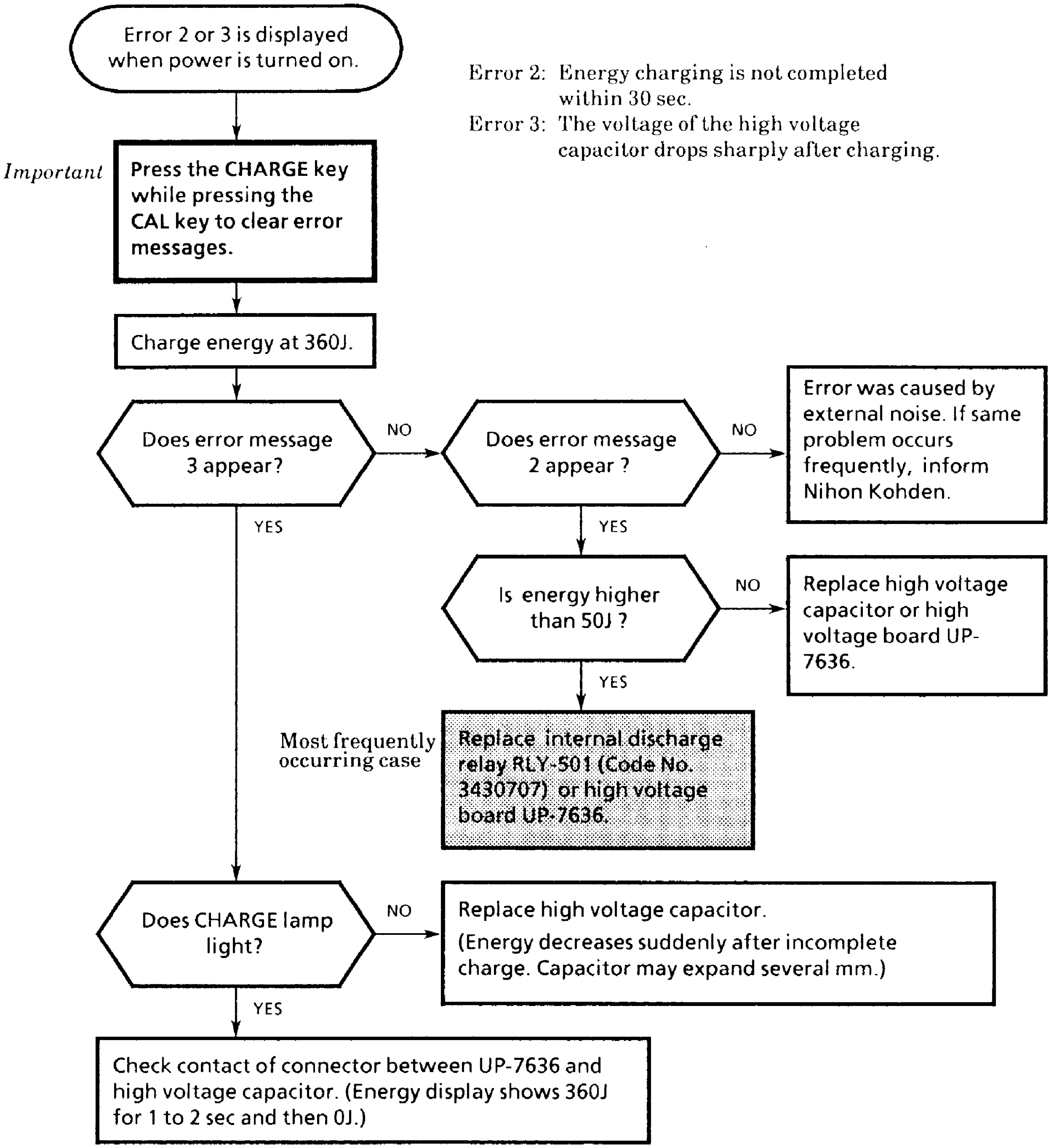

Error is displayed when power is turned on
Turn off the power.
Check to see if ICs in sockets are firmly inserted in the ECG/CPU board.
Remove the ICs from the sockets and insert them again.
Turn on the power again.
Does ERROR 1 appear?
NO
YES
Replace the ECG/CPU board.
End

Error 1: RAM or I/O port IC is defective

4-3 Error 2, 3

Error 2: Energy charging is not completed within 30 sec.

Error 3: The voltage of the high voltage capacitor drops sharply after charging.



Error 2 or 3 is displayed when power is turned on.

Important

Press the CHARGE key while pressing the CAL key to clear error messages.

Charge energy at 360J.

Does error message 3 appear?

Does error message 2 appear ?

Error was caused by external noise. If same problem occurs frequently, inform Nihon Kohden.

Is energy higher than 50J ?

Replace high voltage capacitor or high voltage board UP-7636.

Most frequently occurring case

Replace internal discharge relay RLY-501 (Code No. 3430707) or high voltage board UP-7636.

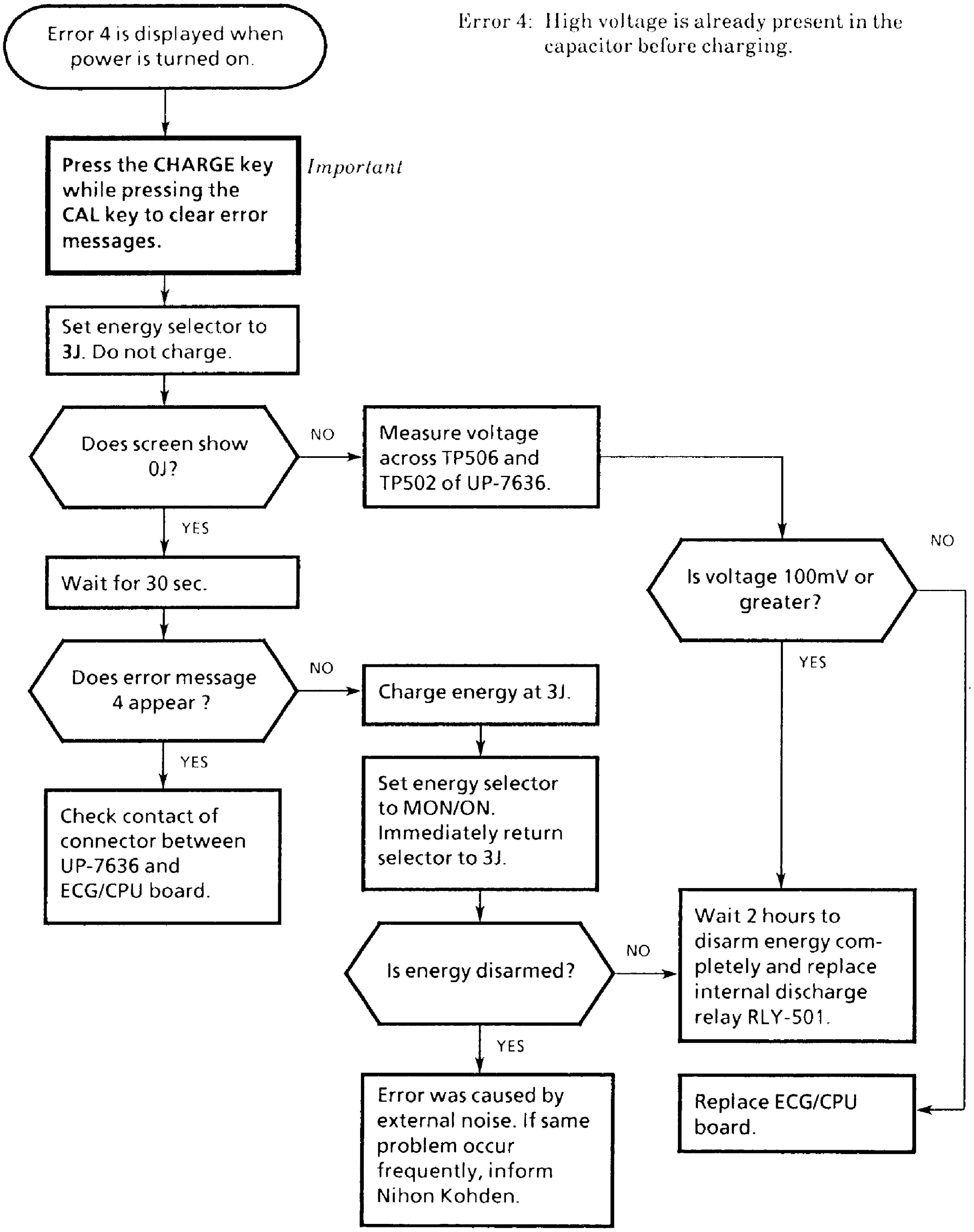
Does CHARGE lamp light?

Replace high voltage capacitor.
(Energy decreases suddenly after incomplete charge. Capacitor may expand several mm.)

Check contact of connector between UP-7636 and high voltage capacitor. (Energy display shows 360J for 1 to 2 sec and then 0J.)

4-4 Error 4

Error 4: High voltage is already present in the capacitor before charging.


Error 4 is displayed when power is turned on.
Press the CHARGE key while pressing the CAL key to clear error messages.
Important
Set energy selector to 3J. Do not charge.
Does screen show 0J?
NO
Measure voltage across TP506 and TP502 of UP-7636.
YES
Wait for 30 sec.
Is voltage 100mV or greater?
NO
YES
Does error message 4 appear ?
NO
Charge energy at 3J.
YES
Check contact of connector between UP-7636 and ECG/CPU board.
Set energy selector to MON/ON. Immediately return selector to 3J.
Is energy disarmed?
NO
Wait 2 hours to disarm energy completely and replace internal discharge relay RLY-501.
YES
Error was caused by external noise. If same problem occur frequently, inform Nihon Kohden.
Replace ECG/CPU board.

Section 5 ADJUSTMENTS

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  5-1-2 Reference Voltage 5.2
  5-1-3 ECG Amplifier Gain 5.2
  5-1-4 Amplitude of Calibration Waveform 5.3
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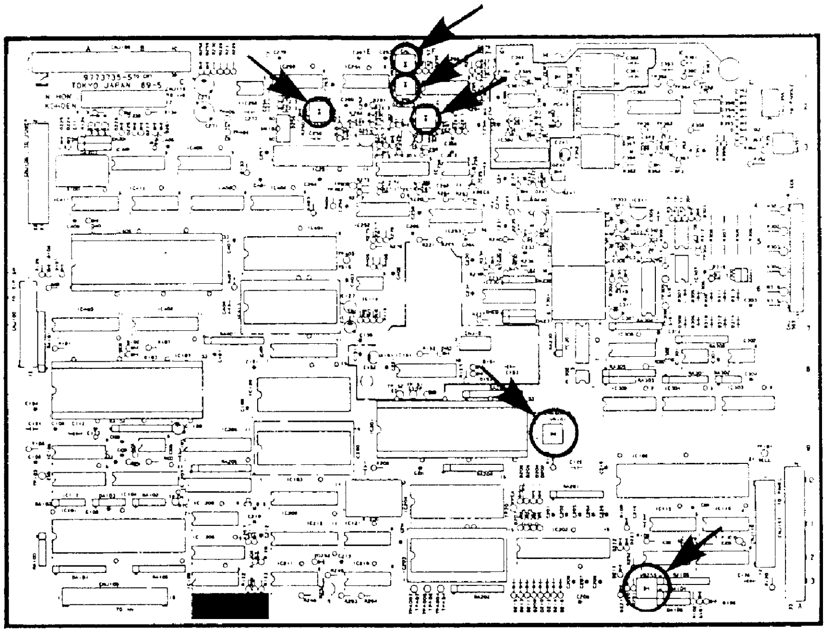
5-1 ECG / CPU Board UP-7635/76351/7737



When replacing the CPU board, no adjustment is required as it has already been adjusted at the factory.

5-1-1 Charging Completion Sound Volume

Adjustment

Charge the energy at 3J and adjust VR101 as follows.

Preset control	Sound
VR101 (HR SOUND)	Maximum

5-1-2 Reference Voltage

Preparation

1. Set ENERGY SELECT switch to "ECG MON POWER ON" position.

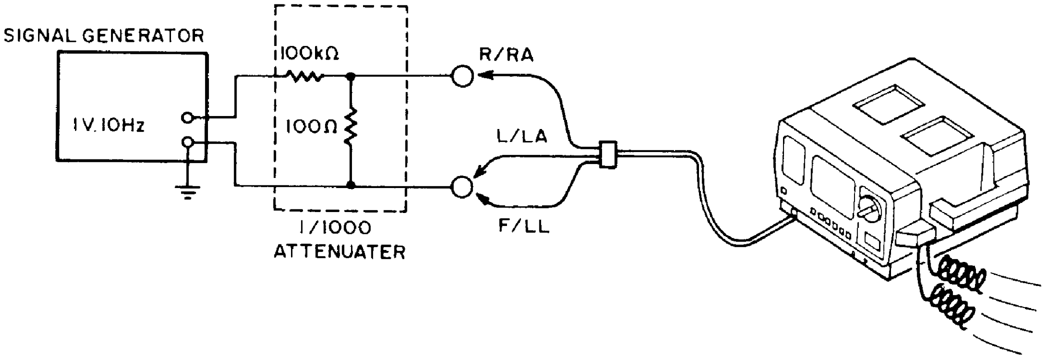
Adjustment

Preset control	Measuring point	Adjustment range
VR252 (REF4V)	TPREF	+ 4 ± 0.001V

5-1-3 ECG Amplifier Gain

Preparation

1. Input the sine wave of 10Hz/1mV p-p divided into 1/1000 of 1 Vp-p to the ECG input leads.
2. Select ECG LEAD (I) and sensitivity (× 1).


SIGNAL GENERATOR
1V. 10Hz
100kΩ
100Ω
1/1000
ATTENUATER
R/RA
L/LA
F/LL

Adjustment

Preset control	Adjustment
VR251 (GAIN)	10 mmp-p on paper

5-1-4 Amplitude of Calibration Waveform

This adjustment should be carried out after completing item 5-1-2.

Preparation

Select × 1 by pressing SENS switch.

Adjustment

Press the CAL button located on the front panel.

Preset control	Adjustment
VR253 (CAL)	10 mm p-p on paper

5-1-5 Amplitude of Test Signal

Preparation

1. Select TEST mode by LEAD switch.
2. Select × 1 by pressing SENS switch.

Adjustment

This adjustment should be carried out after completing item 5-1-2.

Preset control	Adjustment
VR254 (TEST)	10 mm p-p on paper

5-1-6 Paddle Contact Indicator

Preparation

Apply the resistor of the value as shown below between paddle electrodes.

Adjustment

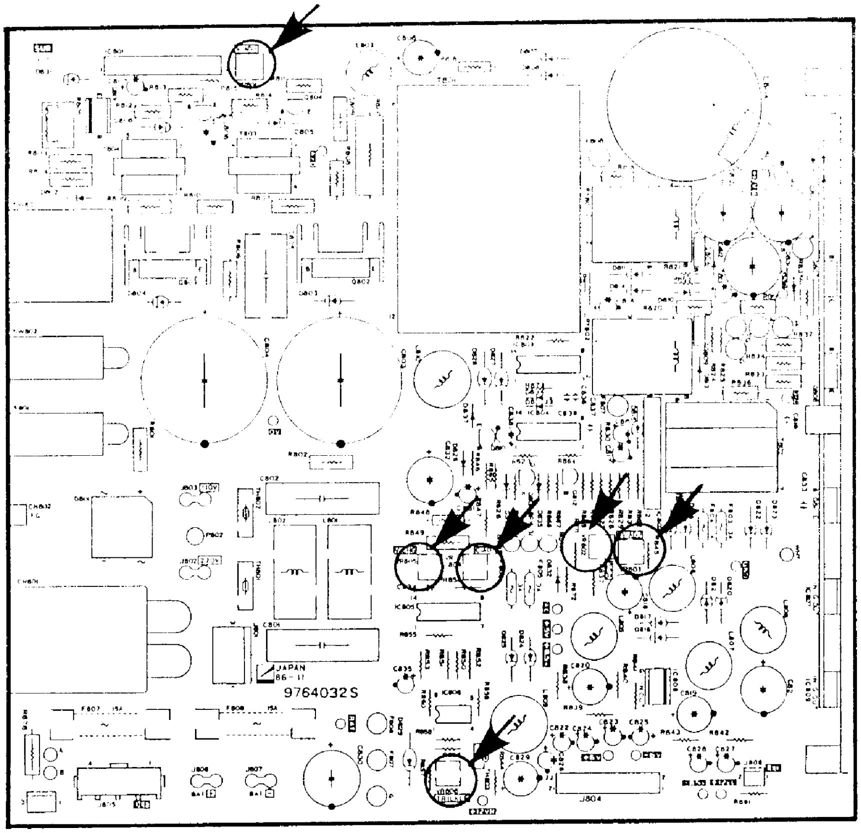
Preset control	Color of paddle contact indicator
VR381 (PC ZERO)	Threshold level of Green and Yellow (100Ω resistor) Threshold level of Yellow and Red (200Ω resistor)

5-1-7 Battery Level Indicator

Adjustment

Preset control	Measuring point	Adjustment
VR525	IC202 pin-28	Voltage at CNJ108 pin-19 × 0.2

5-2 Switching Regulator UP-7640/7720



When changing the switching regulator board, readjustments of VRs are not required.

CAUTION

1. *Do not touch AC primary circuit with one's hand.*
2. *When testing AC primary circuit by the oscilloscope, a power supply isolated from AC line voltage is required.*
3. *Do not use the test terminal 0V to check all of the secondary circuits, because this 0V terminal is applied to the SC line voltage directly. This 0V test terminal must be used for checking the AC primary circuit only.*

5-2-1 Power Supply Voltage + 12 VB

DC +12 VB is mainly used for high voltage circuits. This power supply is output from the AC-DC inverter circuit of this unit.

Preparation

Set the ENERGY SELECT dial to "360J" position.

Adjustment

Press the CHARGE key. After charging is completed, adjust VR801.

Preset control	Measuring point	Adjustment range
VR801 (V.ADJ)	TP + 12VB	+ 12 ± 0.1 V

5-2-2 Power Supply Voltage + 5V

+5VDC output from DC-DC converter is used for the digital circuit.

Preparation

When adjusting the to +5V, the output current load is required. Set the ENERGY SELECT switch to ECG MON POWER ON position to provide DC+5V power supply with the proper current load during adjustment. The 15Ω / 2W resistance also provides the equivalent current load for this power supply.

Adjustment

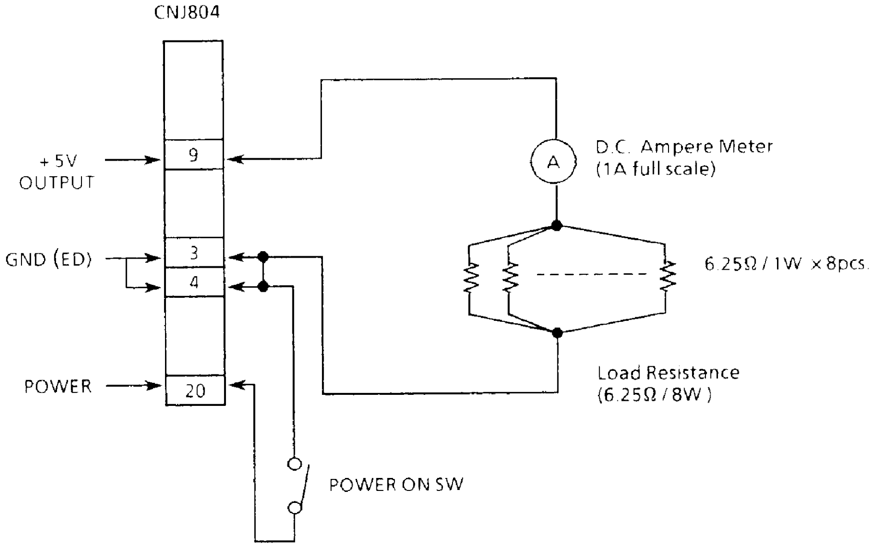
Preset control	Measuring point	Adjustment range
VR803 (5V ADJ)	TP + 5V	+ 5.03 ± 0.05 V

5-2-3 + 5V Current Limiter

When excessive current is loaded to the +5V power supply due to some circut troubles, the output current is limited with 800mA.

Preparation

1. Disconnect connector CNP108 from the P.C.B. (UP-7640).
2. Connect the load resistor and D.C. ampere meter between pin number ⑨ (+5V) and ③, ④ (GND) of CNJ804 as shown below.
3. Connect the power switch between ③, ④ and ⑳ as shown below.


CNJ804
+5V OUTPUT
GND (ED)
POWER
9
3
4
20
A
D.C. Ampere Meter (1A full scale)
6.25Ω / 1W × 8pcs.
Load Resistance (6.25Ω / 8W)
POWER ON SW

The load resistance can be equally provided by using the eight resistors of 50Ω / 1W instead of the one resistor of 6.25Ω / 8W.

Adjustment

Adjust the VR802 so that an ampere meter indicates 800mA.

Preset control	Measuring point	Adjustment value
VR802 (OCP)	See Fig.	800mA

5-2-4 Trickle Charging Voltage

Battery charging circuit has two charging modes. Charging voltages are independently provided to each mode. It is only necessary to adjust the trickle charging voltage according to the following procedures.

Preparation

1. Remove the top casing.
2. Remove the power unit shield cover.
3. Use the fully charged battery when adjusting the trickle charging voltage.

Adjustment

The voltage depends on the ambient temperature.

Preset control	Measuring point	Adjustment range
VR805 (V.CHG)	TPBAT	13.88 ± 0.01V *Ta = 25°C

*Ta = Ambient Temperature

5-2-5 Maximum Charging Current

It is necessary to adjust the maximum charging current according to the following procedures.

Test Circuit

Connect the D.V.M. between across the resister R849. The measuring current can be obtained by the following equation.

$$\text{Charging limit current} = \frac{\text{Indicated value of D.V.M.(V)}}{1\Omega}\ \text{(A)}$$

Adjustment

During charging the battery, adjust VR804.

Preset control	Measuring point	Adjustment value
VR804 (C.ADJ)	Across R849	0.76 V

5-2-6 Current Change from Cycle Charge to Trickle Charge

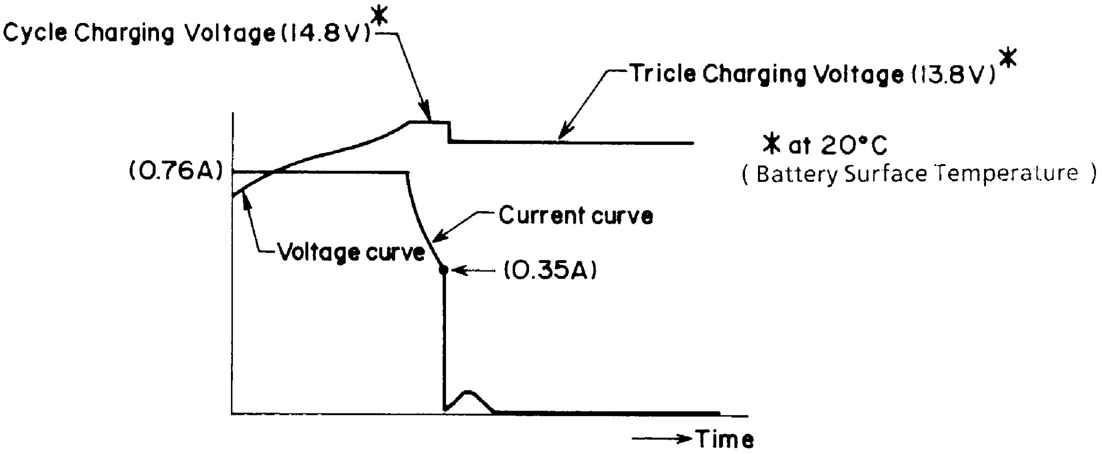
When a current of 0.35A is detected, the charging mode is changed from cycle mode to trickle mode as shown in the Fig. 5-2-5 and charging current is rapidly decreased.

Adjustment

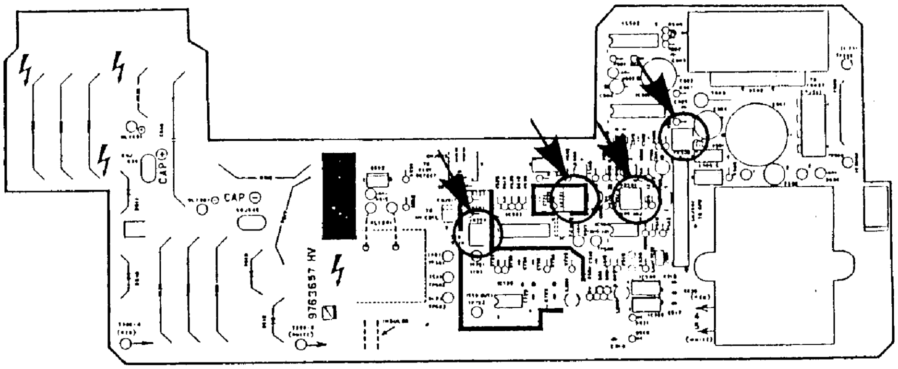
1. Charge the battery fully. An empty battery requires approx. 15 hours to charge completely.
2. Turn off the power by the AC POWER switch.
3. Turn on the power.
4. Monitor the voltage across R849. Constant voltage of 0.76V appears for a while, then the voltage starts decreasing gradually, if adjusted correctly. When the voltage becomes 0.35V, the voltage drops rapidly. If the voltage does not drop at 0.35V, repeat the procedure 2 and 3, adjust VR806, and monitor the voltage.

Preset control	Measuring point	Adjustment value
VR806 (TRICKLE)	Across R849	Constant at 0.76V Drops at 0.35V

Battery Charging Characteristics



5-3 High Voltage Board UP-7636/7851

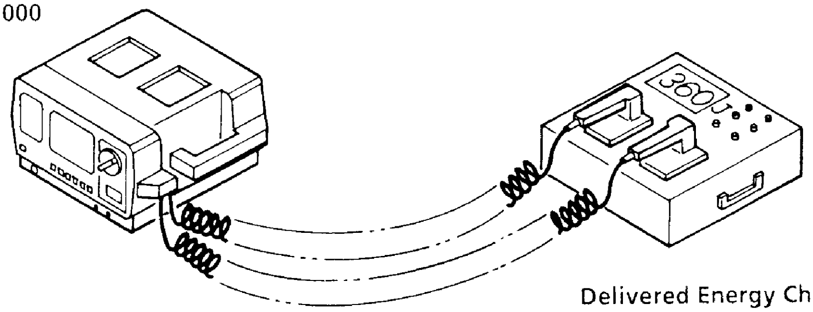

CAP⊕
CAP ⊖
9763657 HV

The following adjustments are for the energy charge and discharge circuit of defibrillation.

5-3-1 Delivered Energy

Preparation

Connect the equipment as shown below.


TEC-7000
360J
Delivered Energy Checker

Adjustment Procedure

1. Select an energy of 360 J and charge the energy.
2. Press discharge buttons to deliver the energy to the checker.
3. If the checker does not show 360 J ± 10%, adjust VR501 and repeat the above procedures.
4. Confirm that the values of other energy levels are in the following range. If not, adjust VR501 so that the checker shows 1 ~ 2 J over the previous level of 360 J.

Selected Energy Level (J)	Delivered Energy Joule Meter	
	TEC-7100/7200/7300A	Other than TEC-7100/7200/7300A
3	3 J ± 1 J	3 J ± 1 J
5	5 J ± 2 J	5 J ± 2 J
10	10 J ± 2 J	10 J ± 2 J
20	20 J ± 10 %	20 J ± 15 %
30	30 J ± 10 %	30 J ± 15 %
50	50 J ± 10 %	50 J ± 15 %
70	70 J ± 10 %	70 J ± 15 %
100	100 J ± 10 %	100 J ± 15 %
150	150 J ± 10 %	150 J ± 15 %
200	200 J ± 10 %	200 J ± 15 %
300	300 J ± 10 %	300 J ± 15 %
360	360 J ± 10 %	360 J ± 15 %

5-3-2 Energy Charging Time

Adjustment

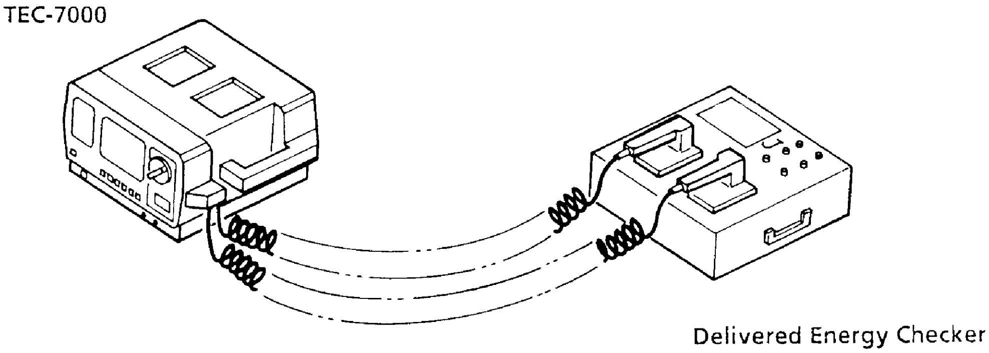
1. Operate the equipment on the AC line.
2. Select an energy of 360 J and charge the energy.
3. If charging time (after pressing the charge button until charging is completed) is out of 9.3~9.7 sec., adjust VR500 and repeat the above procedure.

Preset control	Adjustment range
VR500 (CHG TIME)	9.3 ~ 9.7 sec

5-3-3 TTR Gain (TEC-7200/7300)

Preparation

Connect the equipment as shown below.



Adjustment

1. TEC-7200
   (1) Press the HI / LO LIMITS key while pressing the ↑ key.
   (2) Press REC / STOP key while pressing the ↑ key.
   The TTR and delivered energy level will then be displayed on the heart rate position and set energy position, respectively.
   TEC-7300
   Press both CAL and FREEZE key simultaneously.
   The TTR and delivered energy level will then be displayed on the heart rate position and set energy position, respectively.
2. Select an energy of 50 J and charge the energy.
3. Press discharge buttons to deliver the energy to the checker.
4. If the displayed TTR is not 50 ± 1 Ω, adjust VR720 and repeat procedures 3 and 4.

Preset control	Adjustment range
VR720 (TTR GAIN)	50 ± 1Ω on CRT

5-3-4 Delivered Energy Display (TEC-7200/7300)

Preparation

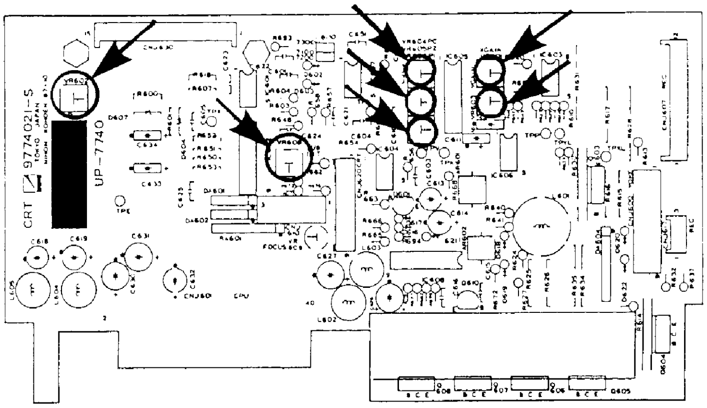
Connect the equipment as shown in Fig. 5-3-3.

Adjustment

1. TEC-7200
   (1) Press the HI / LO LIMITS key while pressing the ↑ key.
   (2) Press REC / STOP key while pressing the ↑ key.
   The TTR and delivered energy level will then be displayed on the heart rate position and set energy position, respectively.
   TEC-7300
   Press both CAL and FREEZE key simultaneously.
   The TTR and delivered energy level will then be displayed on the heart rate position and set energy position, respectively.
2. Select an energy of 50 J and charge the energy.
3. Press discharge buttons to deliver the energy to the checker.
4. If the displayed energy is not 50 ± 1J, adjust VR721 and repeat procedures 3 and 4.

Preset control	Adjustment range
VR721 (TTR ENRG)	50 ± 1J on CRT

5-4 CRT Display Adjustment UP-7740

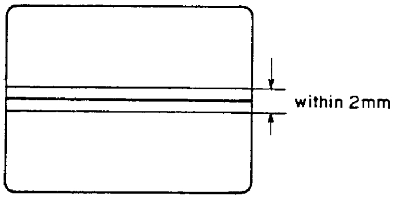


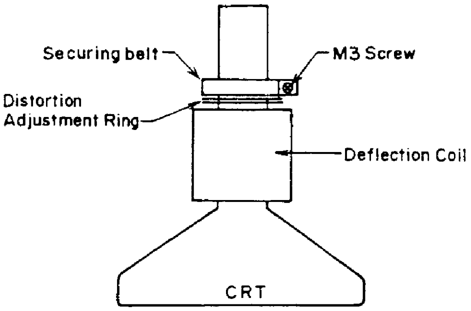
This adjustment is required when changing the deflection coil or the CRT tube. When changing each printed circuit board, this adjustment is not necessary.

5-4-1 Pattern Distortion and Sweep Rotation

Pattern Distortion Adjustment

1. Adjust the distortion adjustment ring mounted on the deflection coil so that the display pattern is placed on a specified position of the CRT screen. (See the following figure.)
2. Adjust the distortion adjustment ring so that no distortion occurs around the corner of the CRT screen.





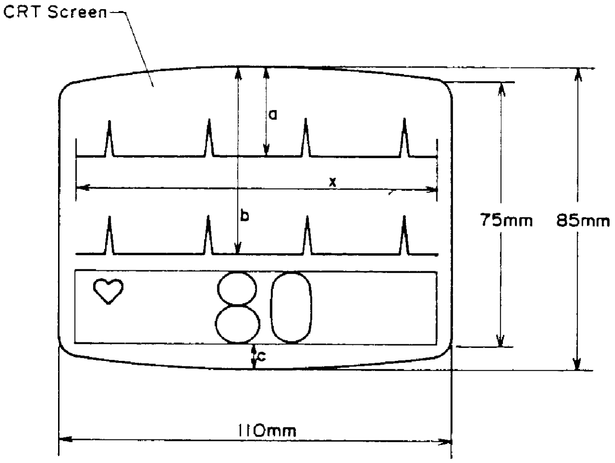
Sweep Rotation Adjustment

1. Loosen the M3 screw mounted on the securing belt.
2. Turn the deflection coil so that a sweep is positioned within a specified area.
3. Secure the M3 screw to fix the deflection coil.

5-4-2 Waveform and Character Position

Adjustment

1. Display the TEST wave by selecting TEST mode.
2. According to the adjustment table described below, adjust the position of the waves and the characters. The symbols, a,b,c and x used in the table are specified as shown below.



Item	Preset control	Adjustment
Sweep Length	VR601 (XGAIN)	X : 102 ± 5 mm
Sweep Horizontal Position	VR602 (X P)	Center of CRT Screen
Character Displat Position	VR604 (PC)	c : 7 ± 1 mm
Trace 2 Veritcal Position	VR605 (P2)	b : 48 ± 1 mm
Trace 1 Vertical Position	VR606 (P1)	a : 25 ± 1 mm
Signal Amplitude on CRT Screen *	VR603 (YGAIN)	10 ± 1 mm on the CRT screen

*Test Circuit

Input the signal of 1 mV / 10Hz to the ECG input cable as shown in Fig. 5-1-2 after confirming the gain of the ECG amplifier is adjusted.

5-4-3 Sub Intensity

Adjustment

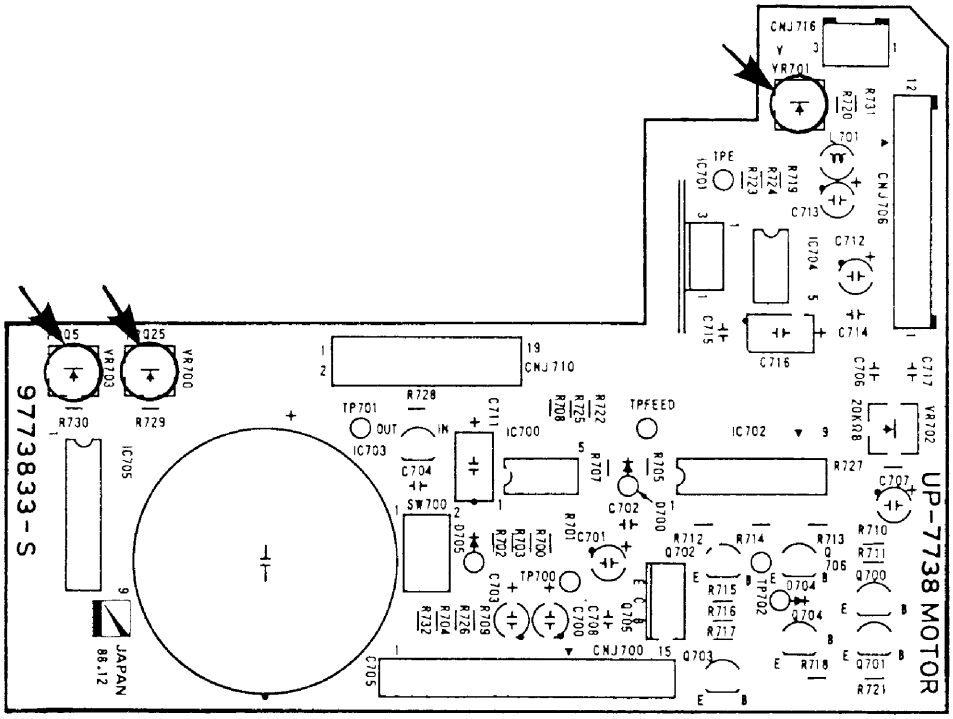
1. Turn the INTENSITY knob fully clockwise.
2. Adjust VR608 so that the raster disppears while the characters are displayed at maximum intensity.

5-4-4 Focus

Adjustment

1. Select the TEST waveform with the LEAD key.
2. Select the synchronized mode with the SYNC key.
3. Adjust VR609 so that the synchronized spot is displayed while characters are not out of focus.

5-5 Motor Control Board UP-7738


CNJ716
VR701
R731
R720
L701
IPE
IC701
R723
R724
R719
CNJ706
C713
C712
IC704
C715
C716
C714
C706
C717
VR702
Q05
Q25
VR703
VR700
R730
R729
IC705
97773833-S
JAPAN
88.12
CNJ710
R728
TP701
OUT
IN
IC703
C711
IC700
R708
R725
R722
TPFEED
IC702
R727
UP-7738 MOTOR
C704
SW700
D705
R702
R703
R700
R701
C701
C702
D700
R705
R707
R712
Q702
R714
R713
Q706
R710
R711
Q700
C707
TP700
C703
R709
R726
R704
R732
C708
C700
Q705
R715
R716
R717
TP702
D704
Q704
R718
Q701
R721
Q703
CNJ700
C705

5-5-1 Motor Rotation

Re-adjustment of this motor rotation is required only when changing the motor and not required when changing the PCB (UP-7648).

Adjustment

Press the REC/STOP key to start recording the test waveform, adjust the VR700 so that the interval between QRSs on the recording paper becomes 25 ±2 mm.

Preset control	Measuring point
VR700 (FREQ 25)	Interval between QRSs on paper: 25 ±2 mm
VR703 (FREQ 5) (TEC-7300 only)	Interval between QRSs on paper: 5 ±0.7 mm

5-5-2 Thermal Head Supply Voltage

CAUTION

Do not supply a voltage exceeding the specified head supply voltage to protect the thermal head element.

This adjustment is required when PCB of UP-7738 or the thermal head is replaced.

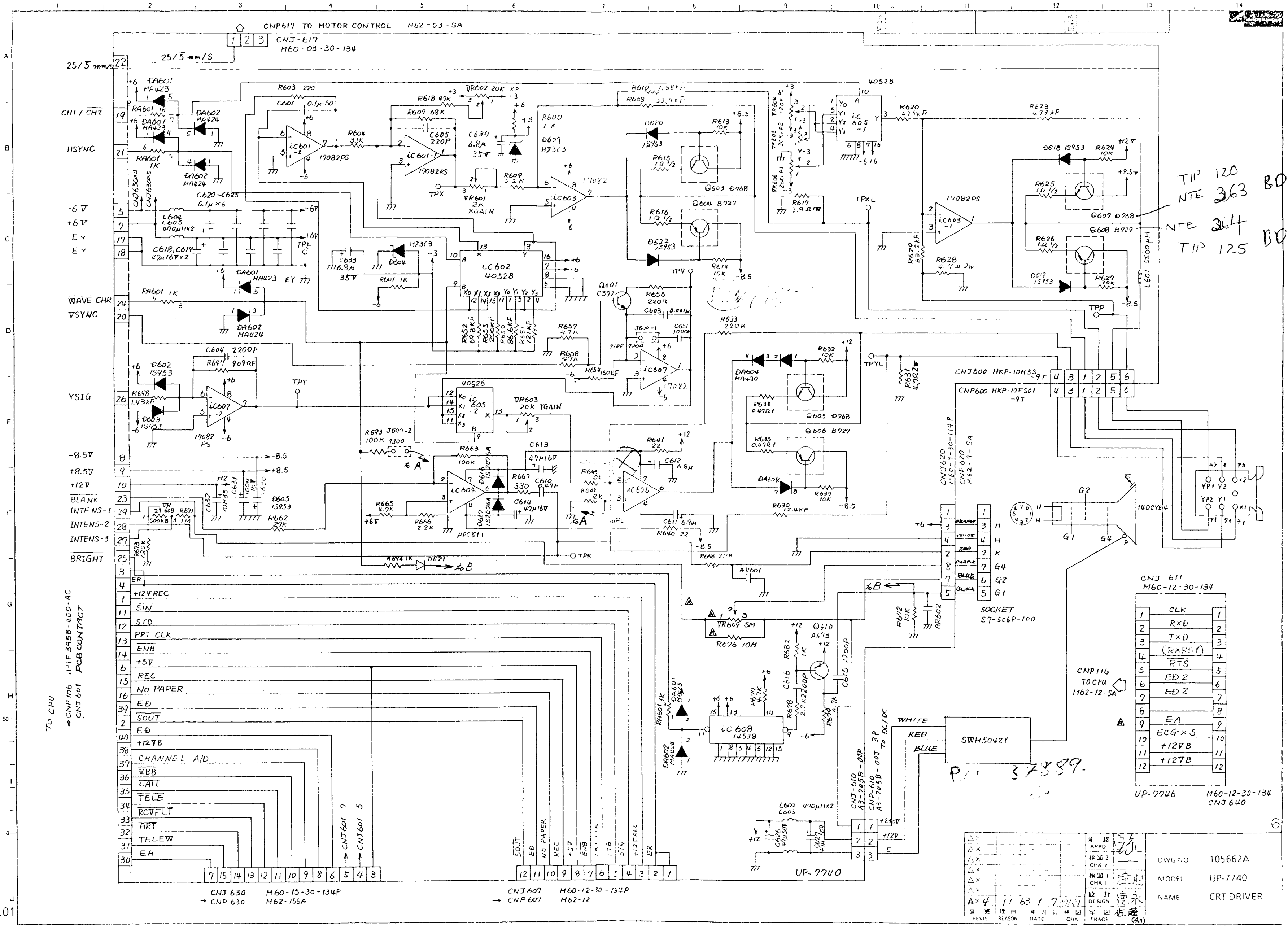
Adjustment

Adjust the VR701 so that the D.V.M. indicates the voltage shown in the following table.
The head resistance is indicated by the sticker attached on the thermal head.

Head resistance	Vth
132 ~ 139	7.9 ~ 8.0
140 ~ 149	8.0 ~ 8.2
150 ~ 159	8.2 ~ 8.4
160 ~ 169	8.4 ~ 8.6
170 ~ 179	8.6 ~ 8.8
180 ~ 189	8.8 ~ 9.0
190 ~ 199	9.0 ~ 9.1
200 ~ 209	9.1 ~ 9.3
210 ~ 219	9.3 ~ 9.5
220 ~ 229	9.5 ~ 9.7
230 ~ 239	9.7 ~ 9.8
240 ~ 249	9.8 ~ 10.0
250 ~ 260	10.0 ~ 10.2

Note: In TEC-7100/7200/7300C, increase the Vth by 1.1 times.
(Ex. 132~139 Ω: 8.7~ 8.8 V)

Preset control	Measuring point	Adjustment range
VR701 (V)	TP701	7.9 ~ 10.2 V (Vth)


CNP617 TO MOTOR CONTROL M62-03-SA
CNJ-617 M60-03-30-134
25/5 mm/S
CH1 / CH2
HSYNC
-6V
+6V
EY
EY
WAVE CHR
VSYNC
YSIG
-8.5V
+8.5V
+12V
BLANK
INTENS-1
INTENS-2
INTENS-3
BRIGHT
DA601 MA423
DA602 MA424
RA601 1K
C620~C625 0.1μ×6
L604 L603 470μH×2
C618, C619 47μ16V×2
TPE
R603 220
C601 0.1μ-30
iC601-2 17082PS
iC601-1 17082PS
R604 33K
R618 47K
R607 68K
C605 220P
VR602 20K XP
C634 6.8μ 35V
VR601 2K XGAIN
TPX
R609 2.2K
R600 1K
D607 HZ3C3
iC603 17082
iC602 40528
C633 6.8μ 35V
HZ3C3
D604
R601 1K
R610 1.58K
R608 33.2KF
D620 1S953
R613 10K
R615 1Ω 1/2
Q603 D768
R616 1Ω 1/2
Q604 B727
D622 1S953
R614 10K
TPV
40528
iC 605-1
R620 475KF
R617 3.9 R1W
TPXL
iC603-1 14082PS
R629
R628 4.7Ω 2W
R623 499KF
D618 1S953
R624 10K
R625 1Ω 1/2
Q607 D768
Q608 B727
R626 1Ω 1/2
D619 1S953
R627 10K
L601 5500μH
TPP
TIP 120
NTE 263
BD6
NTE 264
TIP 125
BD6
Q601 C392
R656 220Ω
C603 0.001μ
R657 4.7K
R658 4.7K
R654 150KF
iC607 17082
R633 220K
DA604 MA430
R632 10K
Q605 D768
Q606 B727
R634 0.47Ω
R635 0.47Ω
R637 10K
R630 12.4KF
TPYL
R631 4.02KF
CNJ600 HKP-10H5S-9T
CNP600 HKP-10FS01-9T
C604 2200P
R647 909ΩF
D602 1S953
D603 1S953
R648 1.43KF
iC607-2 17082PS
TPY
iC 605-2
VR603 20K YGAIN
R693 100K J600-2
R663 100K
iC604
R667 330
C613 47μ16V
C610 0.47μ
C614 47μ16V
R665 4.7K
R666 2.2K
μPC811
R664 1K
D621
TPK
R641 22
C612 6.8μ
iC606
R640 22
C611 6.8μ
R668 2.7K
AR601
VR609 5M
R676 10M
C632
C631 10/35
D605 1S953
R662 27K
VR608 500KB
R671 1M
CNJ620 M60-9-30-114P
CNP620 M62-9-SA
WHITE
YELLOW
RED
PURPLE
BLUE
BLACK
SOCKET S7-506P-100
G2
G1
G4
140CYB4
YP1 Y2 YP2 Y1 X2 X1
R612 10K
AR602
Q610 A673
C615 2200P
C616 2.2K 2200P
R682 1K
R678
iC608 14538
DA601 MA423
DA602 MA424
SWH5042Y
CNJ-610 A3-705B-00P
CNP-610 A3-705B-00J
TO DC/DC
L602 L603 470μH×2
C626 47μ35V
C627
UP-7740
CNP116 TO CPU M62-12-SA
CNJ 611 M60-12-30-134
CLK
RxD
TxD
(RxRST)
RTS
ED2
ED2
EA
ECG×S
+12VB
+12VB
UP-7746
M60-12-30-134 CNJ 640
TO CPU
CNP106 .HIF 3A5B-40D-AC
CNJ601 PCB CONTACT
+12V REC
SIN
STB
PRT CLK
ENB
+5V
REC
NO PAPER
ED
SOUT
ED
+12VB
CHANNEL A/D
ZBB
CALL
TELE
RCVFLT
ART
TELEW
EA
CNJ601 7
CNJ601 5
CNJ 630 M60-15-30-134P
CNP 630 M62-15SA
CNJ607 M60-12-30-134P
CNP607 M62-12
P/N 37889
7653

DWG NO	105662A
MODEL	UP-7740
NAME	CRT DRIVER

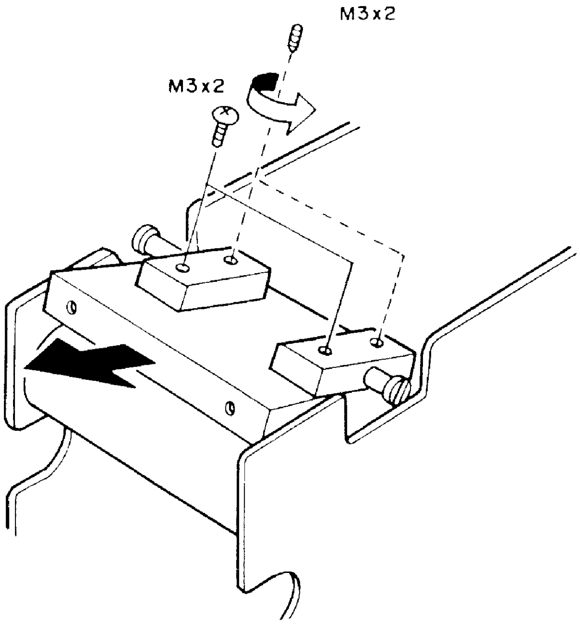
5-6 Thermal Head Replacement & Alignment

Thermal head supply voltage adjustment is required when the head is replaced.

5-6-1 Thermal Head Replacement

P/N: 1800063 ($481-32 +)
4/8/98

1. Remove the main unit's upper casing, as described in section 5-1.
2. Remove the recorder, as described in section 5-2.
3. Slightly loosen the two set-screws of the thermal head.
4. Remove the two screws securing the thermal head to the recording unit.
5. Remove the thermal head as shown below.
6. Replace the old thermal head with a new one, and do the opposite of steps 2. through 5. in reverse order.
7. Align the thermal head, as described in section 5-6-2.



5-6-2 Thermal Head Alignment

1. If the main unit's upper casing has yet to be removed, remove it referring to section 5-1.
2. Make a sample recording, and determine whether or not the density of the printing is even. If the density on the left side is light, turn the recorder on, and slightly turn the left set-screw clockwise until the density is even with the right side.
3. Replace the upper casing by doing the opposite of steps 1) through 3) in section 5-1 in reverse order.

Section 6 DISASSEMBLY

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  6-2-2 Thermal Head 6.3
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  6-2-4 Timing Belt 6.3
  6-2-5 Photosensor 6.4
  6-2-6 Platen 6.4
6-3 High Voltage Section 6.5
  6-3-1 Energy Capacitor, Coil and External Discharge Relay 6.5
  6-3-2 High Voltage Board UP-7636/7851 .... 6.5
  6-3-3 Internal Discharge Relay 6.5
6-4 Front Panel Assembly 6.6
  6-4-1 CRT 6.6
  6-4-2 Front Panel Board UP-7638 .... 6.6
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  6-5-1 Paddle ND-701V (TEC-7100) 6.7
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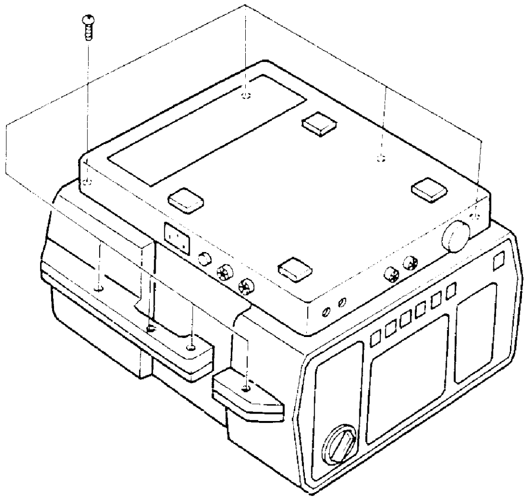
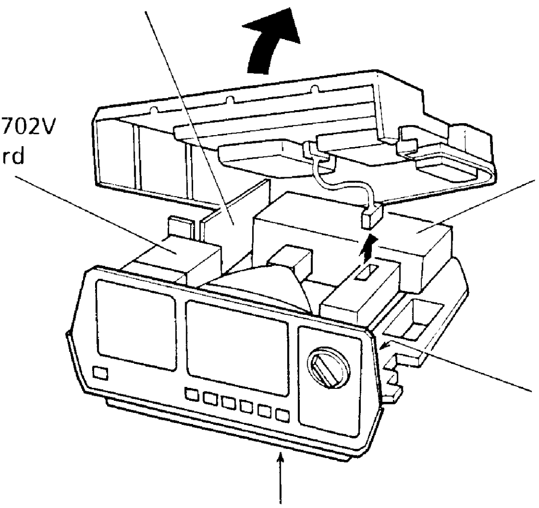
6-8 ECG /CPU Board UP-7635/76351/7737 .... 6.9
6-9 VR and Connector Board UP-7639 & ECG Input Connector 6.10

6-1 Upper Casing (Location of Units)

1. Remove the seven M4 and one M3 screws on the bottom of the main unit and handle.

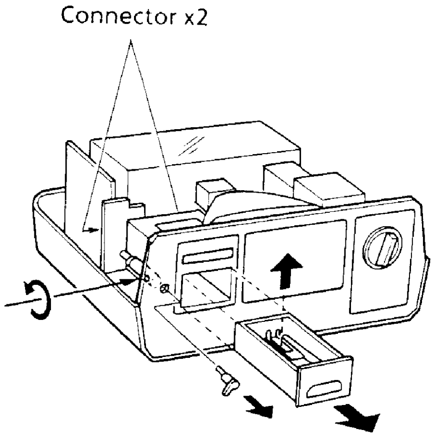


2. Placing the instrument right side up, lift up the upper casing, and disconect the connector.

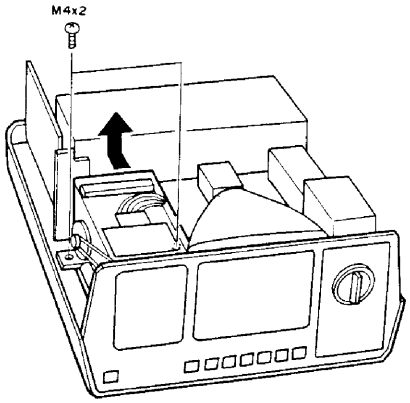

CRT Driver UP-7637/7740
Recorder WS-701V/702V
(Motor Control Board
UP-7643)
High Voltage Unit
(Relay, coil, capacitor,
High Voltage Board UP-7637/7851)
Front Panel Board
UP-7638
Power Unit SC-701V
(SW Regulator Board UP-7640)
ECG/CPU Board UP-7635/76351/7737

6-2 Recorder WS-701V/702V

1. Remove the upper casing as shown in section 6-1.
2. Take out the paper tray while pressing the stopper in the tray upward.
3. Loosen the M3 set-screw in the lever shaft using an allen wrench, and take out the lever.
4. Disconnect the two connectors.

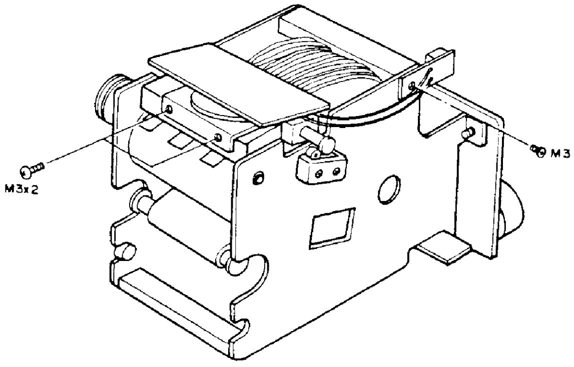


5. Remove the two M4 screws.
6. Pulling the recorder backward, lift it up.



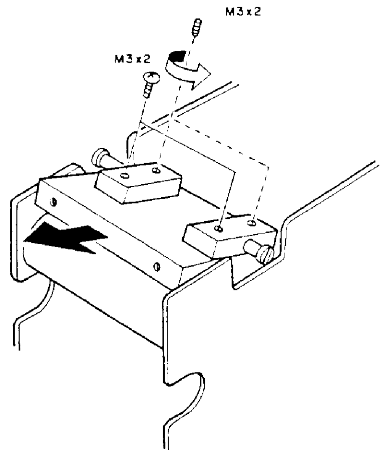
6-2-1 Speaker unit

7. Remove the three M3 screws.



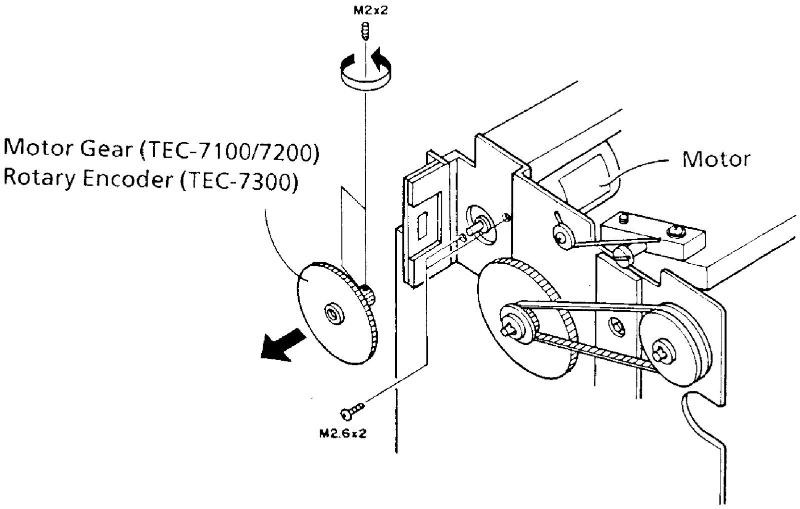
6-2-2 Thermal Head

7. Remove the speaker unit as shown in section 6-2-1.
8. Remove the two M3 screws.
9. Loosen the two M3 set-screws.



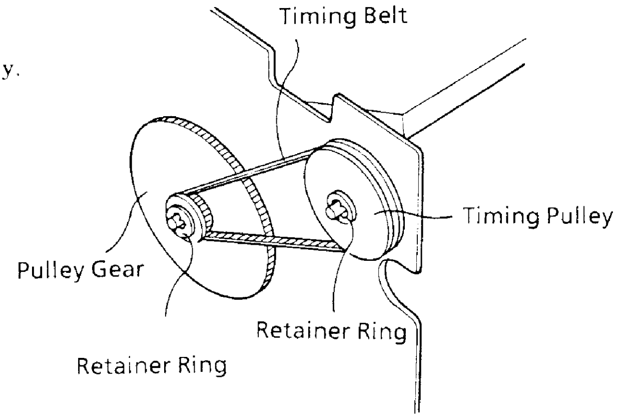
6-2-3 Motor

7. Remove the two set-screws.
8. Remove the gear assy.
9. Remove the two M2.6 screws.


M2x2
Motor Gear (TEC-7100/7200)
Rotary Encoder (TEC-7300)
Motor
M2.6x2

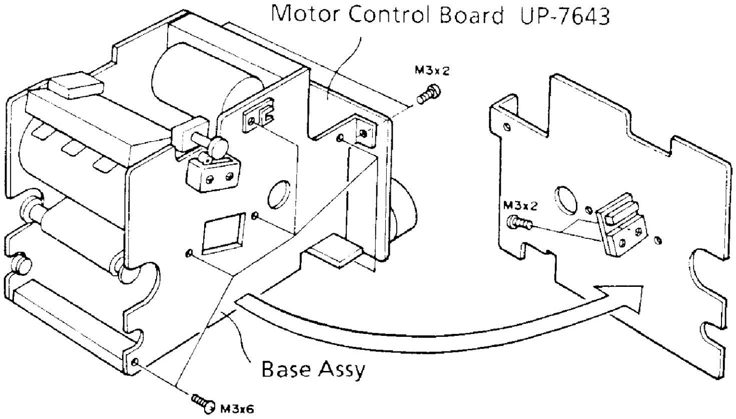
6-2-4 Timing Belt

7. Remove the two retainer rings.
8. Remove the pulley gear and timing pulley.


Timing Belt
Timing Pulley
Pulley Gear
Retainer Ring
Retainer Ring

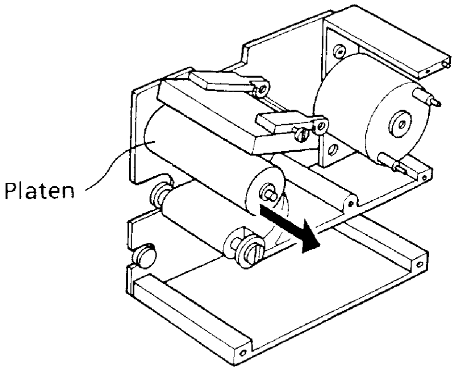
6-2-5 Photosensor

7. Remove the two M3 screws on the motor control board UP-7738.
8. Remove the six M3 screws on the side panel of the recorder.
9. Remove the two M3 screws on the photosensor behind the panel.


Motor Control Board UP-7643
M3x2
M3x2
Base Assy
M3x6

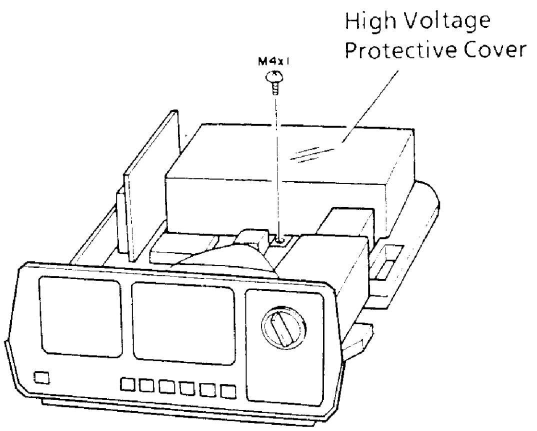
6-2-6 Platen

7. Remove the side panel of the recorder as shown in the step 7 and 8 of section 6-2-5.
8. Remove the motor gear and timing pulley as shown in section 6-2-4.



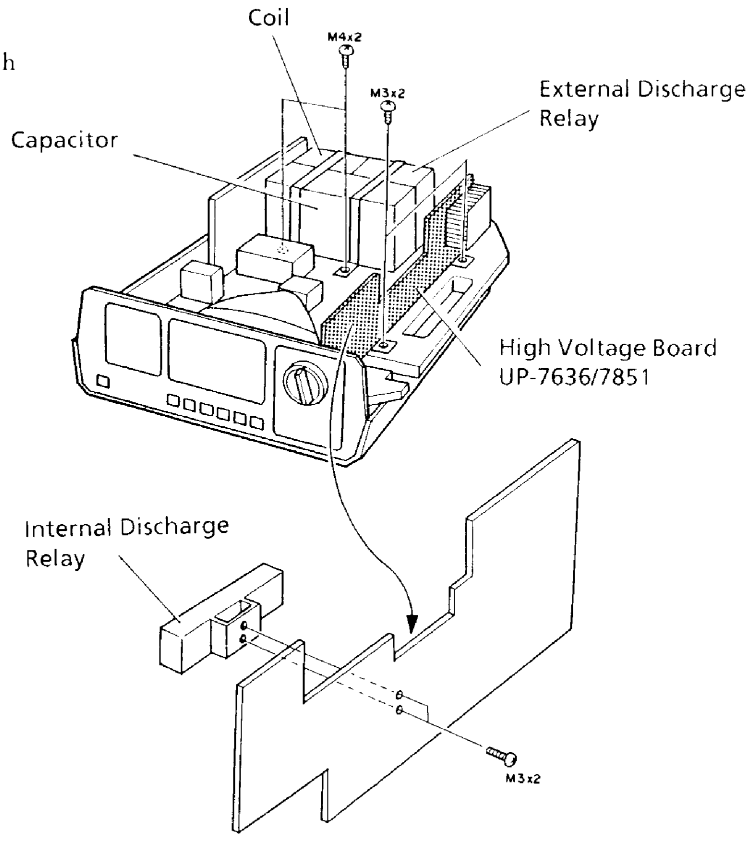
6-3 High Voltage Section

1. Remove the upper casing as shown in section 6-1.
2. Remove the M4 screw.
3. Lift up the cover.


M4x1
High Voltage
Protective Cover

6-3-1 Energy Capacitor, Coil and External Discharge Relay

4. Remove the two M4 screws.
5. Loosen the securing belt.
6. Disconnect the connectors to remove each component.


Coil
M4x2
M3x2
External Discharge
Relay
Capacitor
High Voltage Board
UP-7636/7851
Internal Discharge
Relay
M3x2

6-3-2 High Voltage Board UP-7636/7851

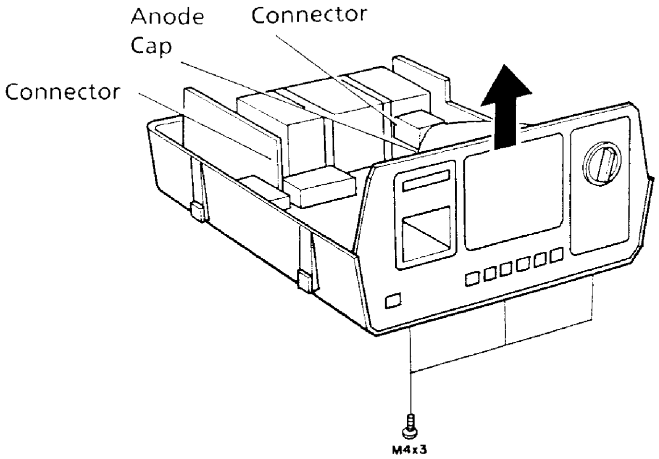
4. Disconnect the connectors.
5. Remove the two M4 screws.
6. Lift up the board.

6-3-3 Internal Discharge Relay

4. Remove the high voltage board as shown in section 6-3-2.
5. Remove the two M3 screws.
6. Desolder the four leads.

6-4 Front Panel Assembly

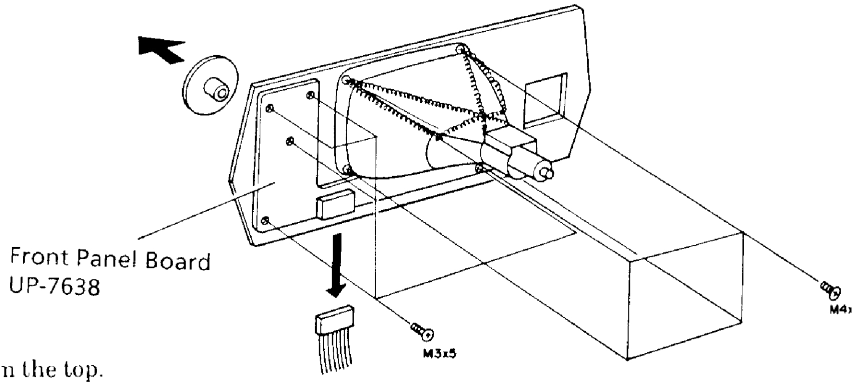
1. Remove the upper casing as shown in section 6-1.
2. Remove the recorder as shown in section 6-2.
3. Disconnect the two connectors and anode cap.
4. Remove the three M4 screws.
5. Lift up the assembly.



6-4-1 CRT

6. Remove the four M4 screws.

6-4-2 Front Panel Board UP-7638



6. Disconnect the connector.
7. Confirm that the energy selector is set to the OFF position.
8. Loosen the set-screw in the energy selector dial inserting an allen wrench from the top.
9. Set the energy selector to the 10J position.
10. Loosen the other set-screw in the same manner.
11. Remove the dial.
12. Remove the five M3 screws.

When setting the dial;

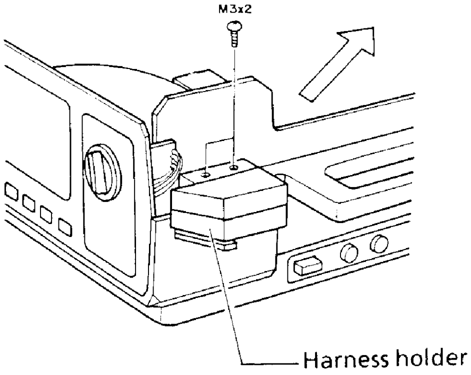
13. Rotate the shaft so that the flat cut plane of the shaft faces up.
14. Secure the set-screw so that the dial is set to the OFF position.
15. Set the energy selector to the 10J position and secure the other set-screw.

6-5 Paddle / Paddle Connector Receptacle

1. Remove the upper casing as shown in section 6-1.

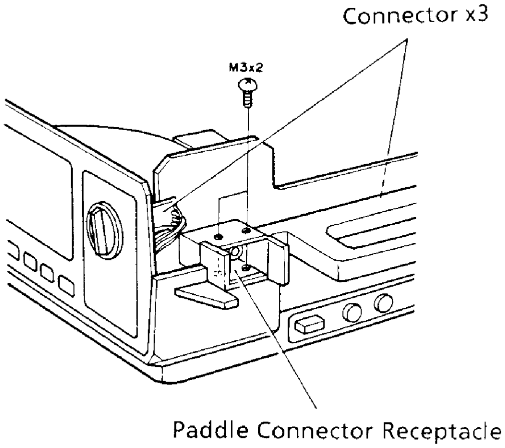
6-5-1 Paddle ND-701V (TEC-7100)

2. Remove the two M3 screws.
3. Disconnect the three connectors connected inside the instrument.
4. Remove the harness holder.


M3x2
Harness holder

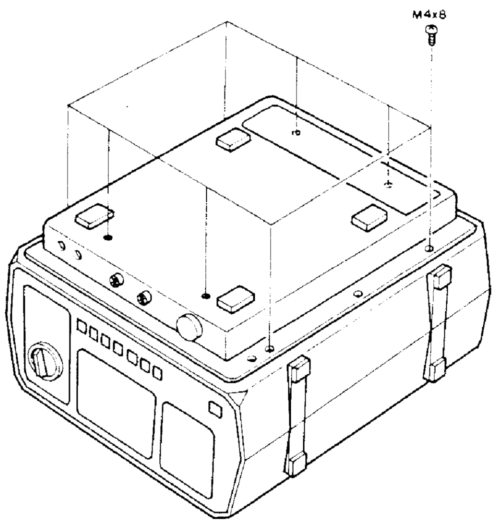
6-5-2 Paddle Connector Receptacle (TEC-7200/7300)

2. Disconnect the three connectors connected inside the instrument.
3. Remove the two M3 screws.

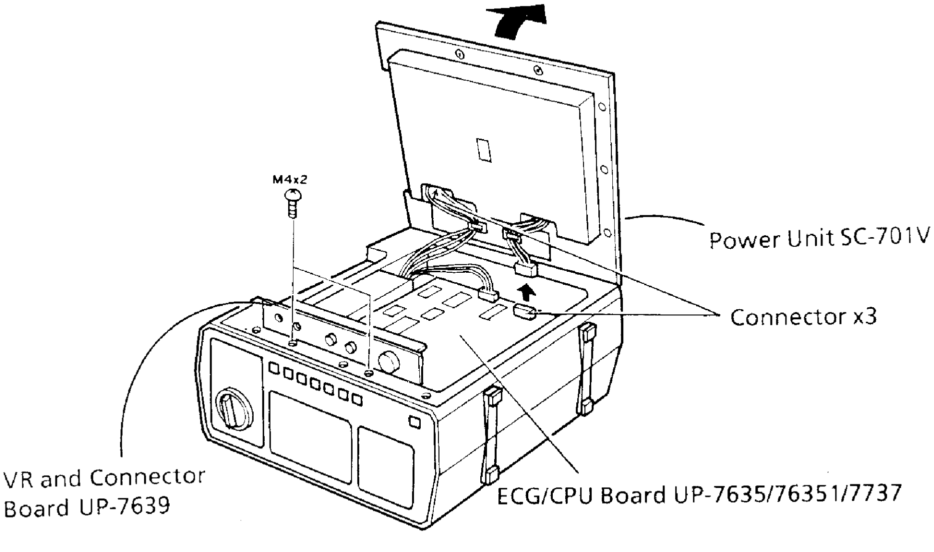

Connector x3
M3x2
Paddle Connector Receptacle

6-6 Lower Casing

1. Remove the eight M4 screws on the bottom of the main unit.

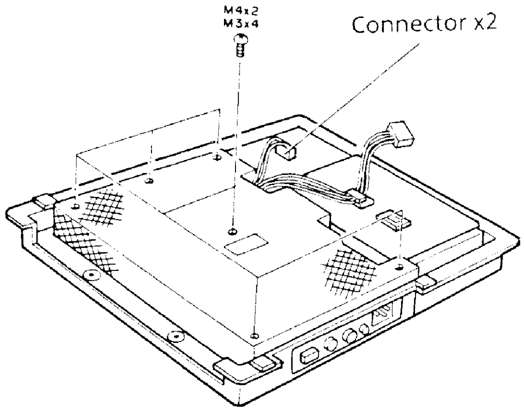


2. Open the lower casing from the front side.
3. Disconnect the three connectors.

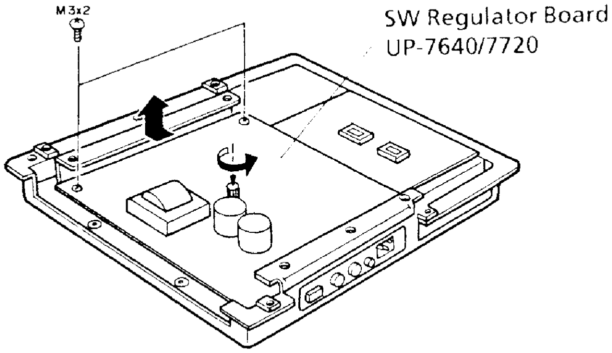

M4x2
Power Unit SC-701V
Connector x3
VR and Connector Board UP-7639
ECG/CPU Board UP-7635/76351/7737

6-7 Power Unit SC-701V (SW Regulator Board UP-7640/7720)

1. Remove the upper casing as shown in section 6-6.
2. Disconnect the two connectors.
3. Remove the two M4 and four M3 screws.
4. Reomve the shield case.

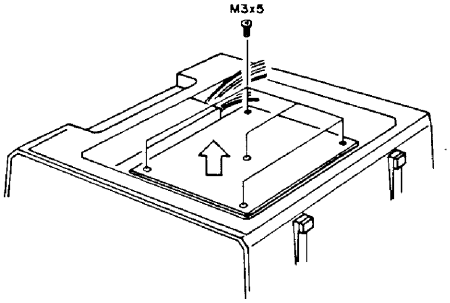

M4x2
M3x4
Connector x2

5. Remove the two M3 screws.
6. Remove the hexa-bolt.
7. Pressing the the board towards the opposite side of the AC inlet, lift up the board.


M3x2
SW Regulator Board
UP-7640/7720

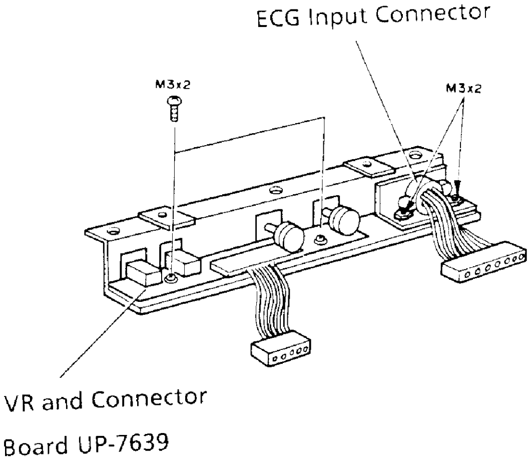
6-8 CPU Board UP-7635/76351/7737

1. Remove the upper casing as shown in section 6-6.
2. Disconnect the eight connectors.
3. Remove the five M3 screws.



6-9 VR and Connector Board UP-7639 & ECG Input Connector

1. Remove the upper casing as shown in section 6-6.
2. Disconnect the two connectors.
3. Remove the two M4 screws.
4. Take out the assembly.
5. Remove the two M3 screws.


ECG Input Connector
M3x2
M3x2
VR and Connector
Board UP-7639

Section 7 MECHANICAL PARTS LIST

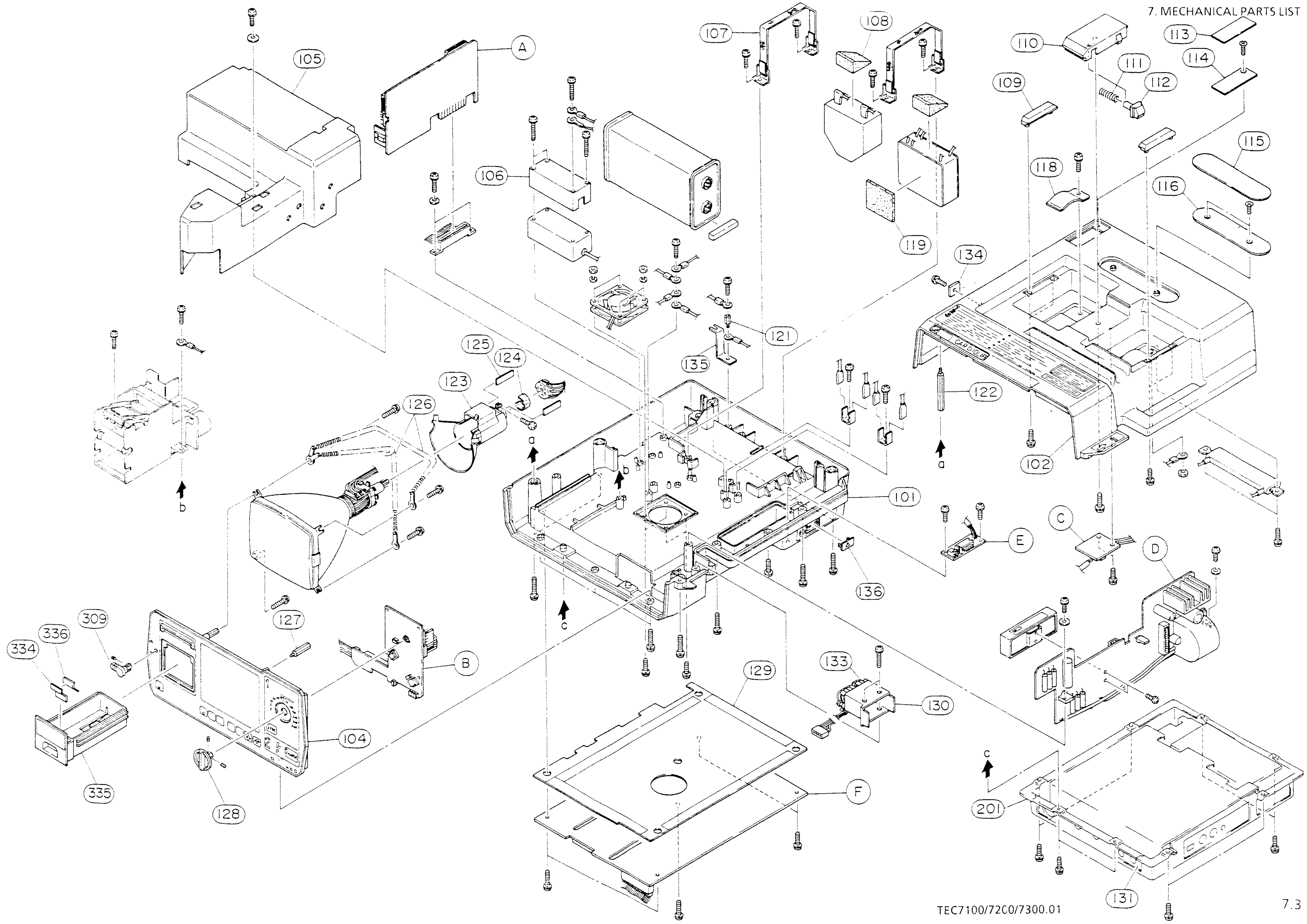
MAIN UNIT-1

INDEX NO.	NK PART NO.	DESCRIPTION	
101	1112-014719	Lower Casing (TEC-7100/7200/7300B, G)	下部ケース (TEC-7100/7200/7300B, G)
	1111-003261E	Lower Casing (Others)	下部ケース (Others)
102	1112-014728	Upper Casing (TEC-7100/7200/7300B, G)	上部ケース (TEC-7100/7200/7300B, G)
	1111-003288B	Upper Casing (Others)	上部ケース (Others)
104	1142-000829A	Front Panel Assembly (English) (TEC7100/7200A, C, J, K)	操作パネルASSY (英語)
	1142-000847B	Front Panel Assembly (German) (TEC-7100/7200G)	操作パネルASSY (独語)
	1142-000731	Front Panel Assembly (English) (TEC-7100/7200B)	操作パネルASSY (英語) (TEC-7100/7200B)
	1142-000856A	Front Panel Assembly (Italian) (TEC-7100/7200R)	操作パネルASSY (伊語)
	1142-000865A	Front Panel Assembly (Spanish) (TEC-7100/7200E)	操作パネルASSY (西語)
	1142-000883	Front Panel Assembly (Finnish) (TEC-7100/7200H)	操作パネルASSY (フィンランド語)
	1142-000704C	Front Panel Assembly (CSA) (TEC-7300A)	操作パネルASSY (CSA)
	1142-000963	Front Panel Assembly (English) (TEC-7300J/K/C)	操作パネルASSY (英語)
		Front Panel Assembly (German) (TEC-7300G)	操作パネルASSY (独語)
		Front Panel Assembly (Spanish) (TEC-7300E)	操作パネルASSY (西語)
105	1113-054308	High Voltage Cover (TEC-7100/7200/7300G)	高圧保護カバー
	1111-003314E	High Voltage Cover (Others)	高圧保護カバー (Others)
106	1114-173837	CRT HV Shield Case	CRT DC-DC シールドケース
107	1114-192941	Condenser Securing Belt	コンデンサー取付バンド
108	1114-174604A	HV Damper	HV クッションゴム
109	1113-046683B	Paddle Lock B	パドルロック B
110	1113-046647B	Paddle Lock Case	パドルロックケース
111	5903666	Spring KC-090-080-0230	スプリング KC-090-080-0230

INDEX NO.	NK PART NO.	DESCRIPTION
112	1114-173695A	Paddle Lock パドルロック
113	1124-033827	ZR Blank Sheet ZRブランクシート
114	1114-174212B	ZR Blank Panel (bottom) ZRブランクドパネル
115	1124-033863	ZR Blank Sheet 2 ZRブランクシート2
116	1114-174596A	ZR Blank Panel 2 (bottom) ZR用ブランクドパネル2
117	6402607	Bind Screw M4 x 8 バインド小ネジ M4×8
118	1114-173801A	Test Load Electrode テストロード電極
119	1114-174613	Relay Damper リレー用クッションゴム
121	6492937	Spacer M4.L = 10mm 間隔支柱 M4
122	6491983	Spacer Shaft UN18-2102-0040 L = 70 UN18-2102-0040 L=70
123	1113-046674C	CRT Shield Case CRTシールドケース
124	1114-176576	Shield Tube Sponge シールドチューブスポンジ
125	1114-176487	CRT Insulation Plate CRT 絶縁板
126	1114-122964	CRT Ground Spring CRT用アースバネ
127	1114-179706	CRT Support ブラウン管支柱 L=18
128	1143-004565B	Energy Select Knob エネルギー選択ツマミ
129	1113-046968B	CPU Shield Plate CPU 絶縁板
130	1113-046932A	Socket Housing (TEC-7200/7300) ソケットハウジング
131	1113-047067A	Harness Holder - 1 (TEC-7100) ハーネスホールダー-1
132	1113-047076	Harness Holder - 2 (TEC-7100) ハーネスホールダー-2
133	1113-046736A	Socket Insulator ソケットインスレータ
134	1114-173748A	Rubber Foot (side) ゴム足(横)
135	1114-174221	ZR Ground Mounting ZR用アース金具
136	1114-177735A	Dip Switch Cover ディップスイッチキャップ
A	UP-7740	CRT Driver
B	UP-7638	Front Panel Board
C	UP-7596/7596G	Test Detect Board
D	UP-7636/7851	High Voltage Board
E	UP-7682	DIP Switch Board
F	UP-7635/76351/ 7737	ECG / CPU Board

Recorder-1

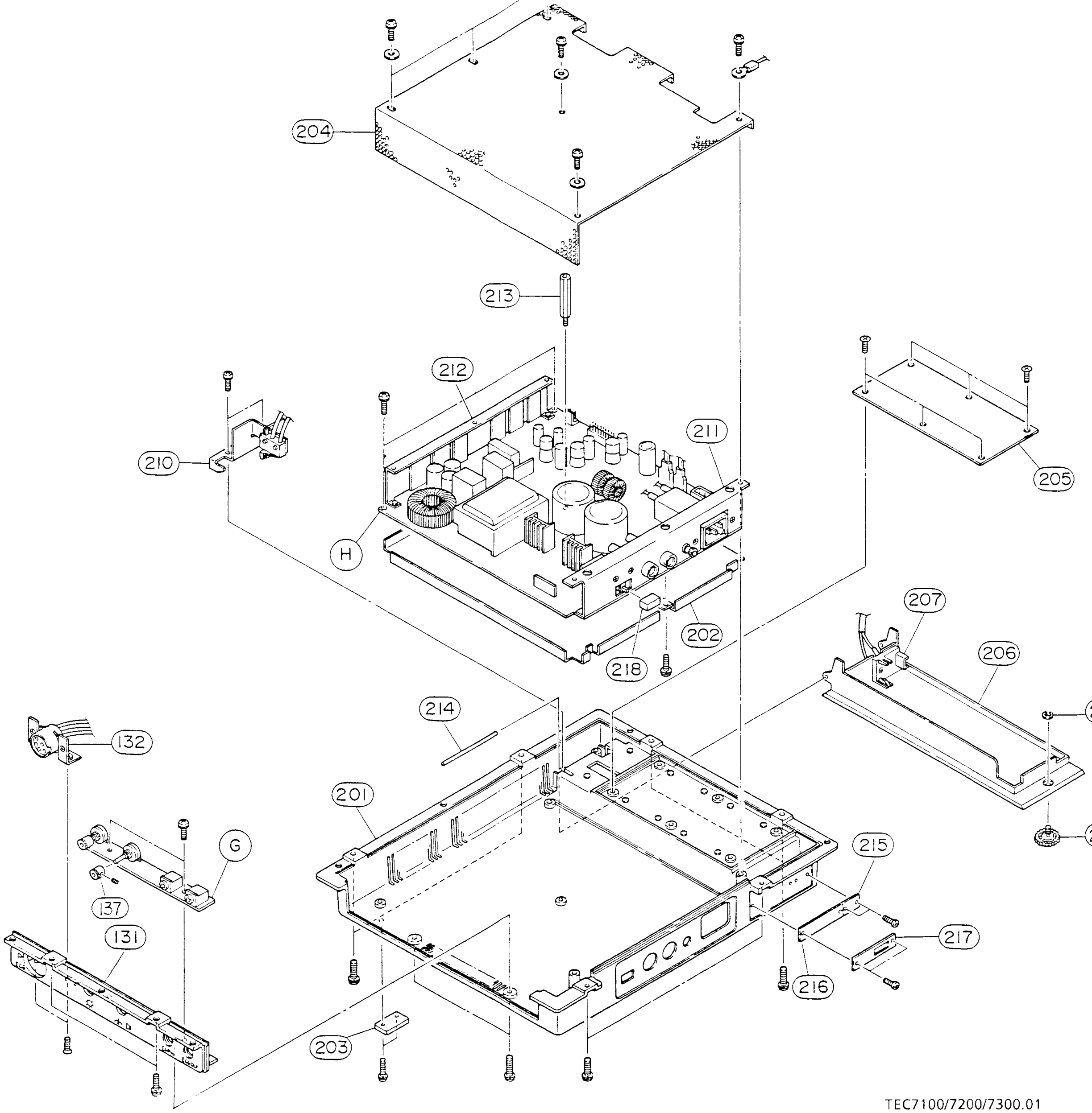
INDEX NO.	NK PART NO.	DESCRIPTION
309	1114-173392	Lever レバー
334	1114-173463A	Tension Spsring テンションバネ
335	1113-046629A	Paper 紙入れケース
336	1114-173543	Felt フェルト


A
a
a
b
b
c
c
E
C
D
B
F

Power Unit

INDEX NO.	NK PART NO.	DESCRIPTION	
131	1122-005122B	Front Connector Panel (2) (English)	前面コネクタパネル (英語)
	1122-005158C	Front Connector Panel (2) (German)	前面コネクタパネル (独語)
	1122-005381A	Front Connector Panel (2) (Spanish)	前面コネクタパネル (西語)
132	1114-173784A	ECG Connector Holder	ECGホルダー
137	1114-173712	VR Knob	VRツマミ
G	UP-7639	VR and Connector Board	

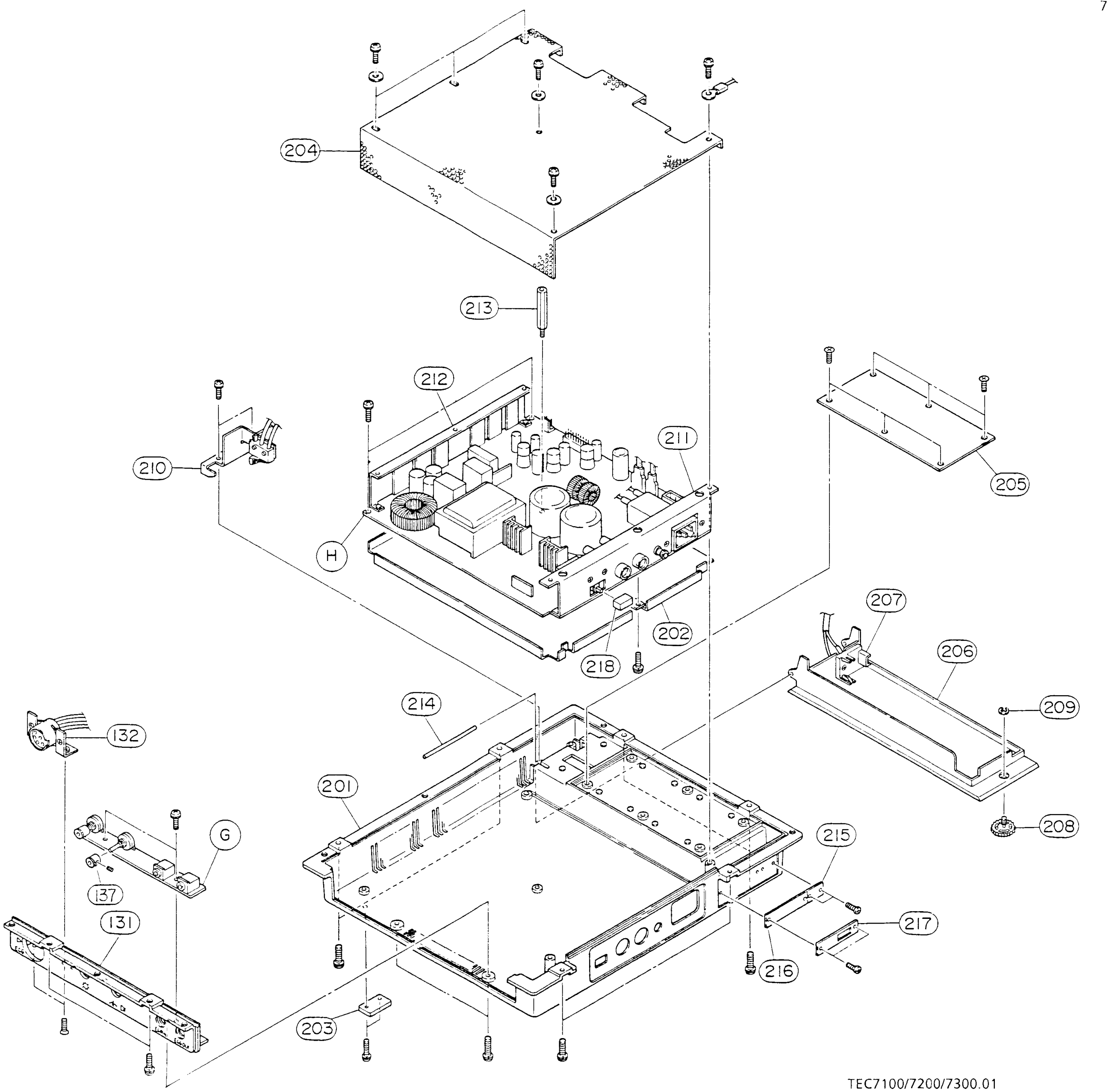
INDEX NO.	NK PART NO.	DESCRIPTION	
201	111-003252A	Power Casing	電源ケース
202	1113-047682A	Shield Cover, Bottom, Power Unit	シールド板(下)
203	1114-173739A	Rubber Foot (bottom)	ゴム足(黒)
204	1113-046665B	Shield Cover, Top, Power Unit	シールドカバー
205	1114-174622	Insulation Plate	断熱板
206	1112-014336A	Battery Case	バッテリーケース
207	2113-013175	Battery Terminal Mounting	バッテリー端子台
208	1144-012581	Battery Case Lock Knob	バッテリーロックツマミ
209	5900152	Retainer Ring	リテナリング
210	1114-173855	Micro Switch Holder	マイクロSW取付金具
211	1113-046816A	Power Unit Chassis	電源下パネル
212	1114-175078	Heat Sink	放熱板
213	6491894	Spacer UN18-2102-0030 L = 38	UN18-2102-0030 L=38
214	1114-173677	Shaft	シャフト
215	1124-000836A	AC Power Plate (117V / 60Hz)	本体AC銘板 (117V/60Hz)
	1124-000845	AC Power Plate (220V / 50Hz)	本体AC銘板 (220V/50Hz)
	1124-000854	AC Power Plate (240V / 50Hz)	本体AC銘板 (240V/50Hz)
215 ~ 217	1104-005397	AC Power Plate (TEC-7100 / 7200G)	本体AC銘板 (TEC-7100/7200G)
216	1194-005307	Plate (2)	本体銘板 (2)
217	1114-144155	Plate (5)	本体銘板 (5)
218	5690306	Knob BS15-01 (ivory)	ツマミ BS15-01 (アイボリ)
H	SC-701V	Power Unit	パワーユニット


H
G

Recorder - 2

INDEX NO.	NK PART NO.	DESCRIPTION
301	1144-012563A	Main Base Assembly (TEC-7100/7200) 基台 ASSY
	1144-014196	Main Base Assembly (TEC-7300) 基台 ASSY
302	1144-013036	Base Assembly 基板 ASSY
303	1114-173454C	Platen プラテン軸
304	1114-173374A	Guide Flange ガイドフランジ
305	1114-194137	Flange フランジ軸
306	1114-173445A	Paper Guide Spring Plate 当紙バネ
307	1114-173481	Click クリック
308	1114-194128	Microswitch Mounting Plate マイクロスイッチ取付板
310	1114-173516A	Lever Shaft レバー軸
311	1114-173588A	Lever Bearing レバー軸受け
312	1114-173418B	Paper Detection Collar 検出カラー
313	1114-173507A	Spring 回転バネ
314	1144-012572B	Boss Assembly 回転ボス ASSY
315	1114-173614A	Slide Plate スライド板
316	5900179	Retainer Ring E-40 (SUS) リテナリング E-40 (SUS)
317	5900161	Retainer Ring E-32 (SUS) リテナリング E-32 (SUS)
318	5903577	Timing Belt タイミングベルト MM-90-3.2
319	1114-170555	Pully Gear 18-108 プーリ歯車 18-108
320	1114-178298	Timing Pully 40 タイミングプーリ 40
321	6492429	Spacer Φ4×4 スペーサ Φ4×4
322	1114-173436	Head Spring 1.0 diameter (left) ヘッドバネ Φ1.0 (左)
323	1144-012545	Motor Gear Assembly (TEC-7100/7200) モータ歯車ASSY
323 + L	4740986	Rotary Encorder (TEC-7300) ロータリエンコーダ200P/R
324	1114-173534B	Gear Shaft 中継軸
325	1114-173605	Sensor Mounting Plate (TEC-7100/7200) 検出センサ取付板
	1114-194574	Sensor Mounting Plate (TEC-7300) 磁気センサ取付板
326	1114-173427	Head Spring 1.0 diameter (right) ヘッドバネ Φ1.0 (右)
327	1114-170029A	Head Holder ヘッド取付金具
328	1114-173472	Head Main Shaft ヘッド主軸

INDEX NO.	NK PART NO.	DESCRIPTION
329	1114-176585	Guide Spring ガイドバネ
330	1114-176496B	Speaker Plate スピーカー取付板
331	1114-173766A	Speaker Sponge スピーカースポンジ
332	1114-194119	Head Collar ヘッドあげカラー
333	5900188	Retainer Ring E-50 (SUS) リテナリング E 50 (SUS)
334	1114-173463A	Tension Spring テンションバネ
337	1114-173525	Guide Shaft ガイド軸 A
I	UP-7713	Speaker Connection Board
J	UP-7702	Feed Sensor Board
K	UP-7738	Motor Control Board
L	4790673	Magnetic Sensor FP-2R-02 (TEC-7100/7200)
M	UP-7644	Paper Sensor Board
N	4810447	Motor EN35-H107N1B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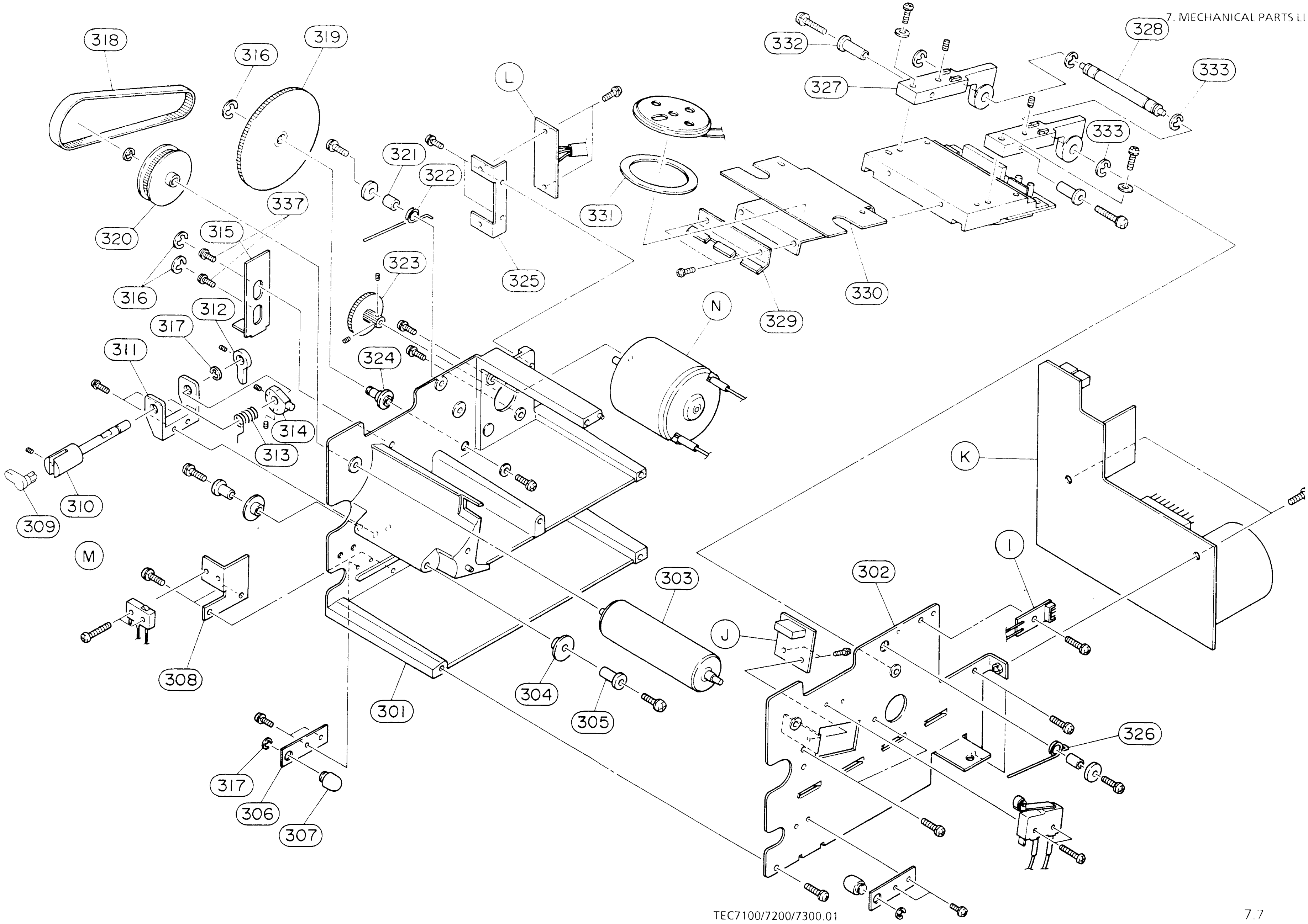
L
N
K
M
I
J

Section 8 Electrical Parts List

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- TEC-7100#
  - TEC-7000X CHASSIS PARTS-1 ---------- 8.4
  - YZ-00#G# CHASSIS PARTS-2 ---------- 8.35
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    - UP-7639 VR AND CONNECTOR BD ---------- 8.11
  - UP-7682 DIP SW BD ---------- 8.14
  - US-7635# ECG/CPU BD (with ROM)
    - UP-76351 ECG/CPU BD (without ROM) ---------- 8.29
  - UP-7851 (TEC-7100G) / UP-7636 (Others) HIGH VOLTAGE BD ---------- 8.27 / 8.9
  - UP-7850 (TEC-7100G) RELAY BD ---------- 8.27
  - UP-7596G (TEC-7100G) / UP-7596 (Others) TEST DETECT BD ---------- 8.5 / 8.4
  - UP-7740 CRT DRIVER ---------- 8.25
  - UP-7638 FRONT PANEL BD ---------- 8.11
  - WS-701V# RECORDER UNIT
    - WS- 701X RECORDER CHASSIS PARTS ---------- 8.34
    - UP-7738 MOTOR CONTROL BD ---------- 8.24
  - SC-701V# POWER UNIT
    - SC-701V# POWER UNIT CHASSIS PARTS-1 ---------- 8.12
    - SC-703X (TEC-7100B/G) / SC-704X (Others) POWER UNIT CHASSIS PARTS-2 ---------- 8.3 / 8.4
    - UP-7720 (TEC-7100B) / UP-7720G (TEC-7100G) / UP-7640 (Others) SW REGULATOR ---------- 8.14 / 8.17 / 8.12
  - ND-701V# EXTERNAL PADDLE
    - ND-705X (TEC-7100G) / ND-701X (Others) EXTERNAL PADDLE ---------- 8.1

Units with # mark differ according to the model.
See page 1.10 for units with # mark.

PAGE

- TEC-7200#
  - TEC-7000X CHASSIS PARTS-1 ---- 8.4
  - YZ-00#G# CHASSIS PARTS-2 ---- 8.35
  - UP-7639# VR AND CONNECTOR BD ---- 8.33
    - UP-7639 VR AND CONNECTOR BD ---- 8.11
  - UP-7682 DIP SW BD ---- 8.14
  - US-7635# ECG/CPU BD (with ROM)
    - UP-7635 ECG/CPU BD (without ROM) ---- 8.5
  - UP-7851 (TEC-7200G) HIGH VOLTAGE BD ---- 8.27
    UP-7636 (Others) 8.9
  - UP-7850 (TEC-7200G) RELAY BD ---- 8.27
  - UP-7596G (TEC-7200G) TEST DETECT BD ---- 8.5
    UP-7596 (Others) 8.4
  - UP-7740 CRT DRIVER ---- 8.25
  - UP-7638 FRONT PANEL BD ---- 8.11
  - WS-701V# RECORDER UNIT
    - WS-701X RECORDER CHASSIS PARTS ---- 8.34
    - UP-7738 MOTOR CONTROL BD ---- 8.24
  - SC-701V# POWER UNIT
    - SC-701V# POWER UNIT CHASSIS PARTS-1 ---- 8.2
    - SC-703X (TEC-7200B/G) POWER UNIT CHASSIS PARTS-2 ---- 8.3
      SC-704X (Others) 8.4
    - UP-7720 (TEC-7200B) SW REGULATOR ---- 8.14
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      UP-7640 (Others) 8.12
  - ND-702V# EXTERNAL PADDLE
    - ND-706X (TEC-7200G) EXTERNAL PADDLE ---- 8.2
      ND-702X (Others) 8.1

Units with # mark differ according to the model.
See page 1.11 for units with # mark.

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- TEC-7300#
  - TEC-7000X CHASSIS PARTS-1 ---- 8.4
  - YZ-00#G# CHASSIS PARTS-2 ---- 8.35
  - UP-7639# VR AND CONNECTOR BD ---- 8.33
    - UP-7639 VR AND CONNECTOR BD ---- 8.11
  - UP-7682 DIP SW BD ---- 8.14
  - US-7737# ECG/CPU BD (with ROM)
    - UP-7737 ECG/CPU BD (without ROM) ---- 8.19
  - UP-7851 (TEC-7300G) / UP-7636 (Others) HIGH VOLTAGE BD ---- 8.27 / 8.9
  - UP-7850 (TEC-7300G) RELAY BD ---- 8.27
  - UP-7596G (TEC-7300G) / UP-7596 (Others) TEST DETECT BD ---- 8.5 / 8.4
  - UP-7740 CRT DRIVER ---- 8.25
  - UP-7638 FRONT PANEL BD ---- 8.11
  - WS-702V# RECORDER UNIT
    - WS- 702X RECORDER CHASSIS PARTS ---- 8.34
    - UP-7738 MOTOR CONTROL BD ---- 8.24
  - SC-701V# POWER UNIT
    - SC-701V# POWER UNIT CHASSIS PARTS-1 ---- 8.12
    - SC-703X (TEC-7300B/G) / SC-704X (Others) POWER UNIT CHASSIS PARTS-2 ---- 8.3 / 8.4
    - UP-7720 (TEC-7300B) / UP-7720G (TEC-7300G) / UP-7640 (Others) SW REGULATOR ---- 8.14 / 8.17 / 8.12
  - ND-702V# EXTERNAL PADDLE
    - ND-706X (TEC-7300G) / ND-702X (Others) EXTERNAL PADDLE ---- 8.2 / 8.1

Units with # mark differ according to the model.
See page 1.12 for units with # mark.

When ordering replacement parts, please specify :

Instrument Type (TEC-7100 / 7200/7300)
Code No.
Description

Note : Most resistors which can be locally procured are omitted.

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-1234	IC101	1234567	1	OPIC	AB1234

Part name
* Abbreviation
Q'ty used in this instrument
NIHON KOHDEN part number
Symbol used in circuit diagrams
Assembly name

* See next page.

ABBREVIATIONS

CN CONNECTOR

ACN	Square
ACN1	Square, plug
ACN2	Square, receptacle
BCN	Card edge
CCN	Round
CCN1	Round, plug
CCN2	Round, receptacle
CN	Coaxial plug or other types
CORD	Accessory cord
NCN	Nylon connector and pins
PCN	For use on PC board, short plug, terminal board

C CAPACITOR

MPC	Metallized film
OFC	Oil
TAC	Tantalum
TCO2	Tantalum, tubelar
TCO4	Tantalum, vertical
VC	Variable
C	Barium titanate, paper, etc.
CEC1	Ceramic, withstanding voltage; <100V
CEC2	Ceramic, withstanding voltage; ≥100V
CM	Module
ECB	Electrolytic, block
CEO2	Electrolytic, tubelar
CEO4	Electrolytic, vertical
FLC	Plastic film, ±5%
FLCB	Plastic film, block
FLC1	Plastic film, vertical
FLC2	Plastic film, tubelar
MCC	Mica

D DIODE

D	Diode, array, for small signal
DB	Block, power, bridge
DP	Power, silicon diode, etc.
LCD	Liquid crystal display
LED	Light emitting diode, LED array
LEDC	LED character
SCR	Silicon controlled rectifier (SCR, thyristor)
ZD1	Zenor, ≤5V
ZD2	Zenor, ≤10V
ZD3	Zenor, >10V

IC INTEGRATED CIRCUIT

ADIC	A/D or D/A converter
AIC	Analog (log. amp., comparator, switch, sample & hold etc.)
CPU	CPU, CPU peripheral devices (RAM, I/O port, etc.)
DIC	Digital (timer, NMOS, PMOS, registor, etc.)
MIC	CMOS
OPIC	Operational amp. buffer amp., etc.
REG	Regulator
TIC	TTL

Q TRANSISTOR

TR	Uni-junction, etc.
TRA	Type 2SA; PNP, high speed
TRB	Type 2SA; PNP, low speed
TRC	Type 2SC; NPN, high speed
TRD	Type 2SD; NPN, low speed
TRP	Photo-electric device, photo-fiber, etc.
FET	**FIELD EFFECT TRANSISTOR**
FET	Type 3SK/3SJ (dual gate, N-ch/P-ch)
FETJ	Type 2SJ (mono gate, P-ch)
FETK	Type 2SK (mono gate, N-ch)

SW SWITCH

ATT	Attenuator
DSW	Digital
PSW1	Push button, 1 button type
~	~ , ~
PSW9	Push button, 9 button type
PSW0	Push button, 10 button type
RSW	Rotary
SW	Micro, DIP, Toggle (tumbler), disc, etc.

T TRANSFORMER

CH	Choke coil
FBTF	Flyback
L	Inductance (coil)
MATF	Matching (IPTF, OPTF, IFTF)
PLTF	Pulse, oscillation TF
PT	Power (except for switching purpose)
T	High voltage, differential, HV unit, power supply, etc.
YOKE	Deflecting yoke

MOTOR

ACMO	AC (including gear head)
DCMO	DC (including gear head)
FAMO	Fan
PUMO	Pulse step (with gear head)

TUBE

CRT	Cathode ray tube
GA	Gas arrestor
NE	Neon tube, neon discharge tube
TUBE	Vacuum tube

R RESISTOR

RM	R module (including R and C)

RV VARIABLE RESISTOR

POT	Potentiometer
TPOT	Potentiometer on PCB, > 15mm in dia.
TVR1	Carbon on PCB
TVR2	Carbon on PCB
TWVR	Wirewound on PCB
VR	On panel
VR1	On panel, ≤ 30mm in dia.
VR2	On panel, > 30mm in dia.
WVR	Wirewound, large current

MISCELLANEOUS

GAGE	Gauge
METR	Meter, digital meter, manometer, electromagnetic counter, etc.
PRB	Pick-up, microphone, ultrasonic probe, etc.
SP	Speaker, headphone, earphone, buzzer, etc.
TD	Transducer, galvanometer coil, pressure meter, differential pressure meter
THP	Thermal/temperature sensor/probe, thermometer, etc.
SOCK	Socket, cap
FH	Fuse holder
FUSE	Fuse
TERM	Terminal, lug board, etc.
BUS	Bus bar
LAMP	Lamp. bracket
BATT	Battery, battery holder, recharger, etc.
UNIT	Display/recorder/printer/disc-drive unit, etc.
MD	Module, unit, hybrid IC, etc.
TH	Line filter, thermistor, varistor, CdS, etc.
RY	Relay, reed relay, solenoid relay
ANT	Antenna
XTAL	Crystal
HEAD	Thermal head/array, discharge head/array
VALV	Valve, electromagnetic valve

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION

ND-701X EXTERNAL PADDLE

ND-701X		3352088	1	SW	SKHCAD (KHC10904)
ND-701X		5422276	1	PCN	HKP-14MS-7BT
ND-701X		5428047	2	PCN	170823-6
ND-701X		5428199	1	PCN	HKP-14FS02-7BT (10)
ND-701X	CNP551-CNP552	5428056	2	PCN	61874-1
ND-701X	D050	1102237	1	LED	HLMP-2855 (GREEN)
ND-701X	SW051-SW052	3202508	2	PSW1	8P-2021

ND-702X EXTERNAL PADDLE

ND-702X		5415792	2	NCN	201330-1 Pin
ND-702X		5422276	1	PCN	HKP-14MS-7BT
ND-702X		5428207	1	PCN	350036-2 with HKP-14FS (4)
ND-702X	D050	1102237	1	LED	HLMP-2855 (GREEN)
ND-702X	D051	1100943	1	LED	HLMP2500 green
ND-702X	D052	1100934	1	LED	HLMP2400 Yellow
ND-702X	D053	1100925	1	LED	HLMP2300 Red
ND-702X	SW050	3352088	1	SW	SKHCAD (KHC10904)
ND-702X	SW051-SW052	3202508	2	PSW1	8P-2021

ND-705X EXTERNAL PADDLE

ND-705X		3352088	1	SW	SKHCAD (KHC10904)
ND-705X		5422276	1	PCN	HKP-14MS-7BT
ND-705X		5428047	2	PCN	170823-6
ND-705X		5428199	1	PCN	HKP-14FS02-7BT (10)
ND-705X	CNP551-CNP552	5428056	2	PCN	61874-1
ND-705X	D050	1102237	1	LED	HLMP-2855 (GREEN)
ND-705X	SW051-SW052	3202508	2	PSW1	8P-2021

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	

ND-706X EXTERNAL PADDLE

ND-706X		5415792	2	NCN	201330-1 Pin
ND-706X		5422276	1	PCN	HKP-14MS-7BT
ND-706X		5428207	1	PCN	350036-2 with HKP-14FS (4)
ND-706X	D050	1102237	1	LED	HLMP-2855 (GREEN)
ND-706X	D051	1100943	1	LED	HLMP2500 green
ND-706X	D052	1100934	1	LED	HLMP2400 Yellow
ND-706X	D053	1100925	1	LED	HLMP2300 Red
ND-706X	SW050	3352088	1	SW	SKHCAD (KHC10904)
ND-706X	SW051-SW052	3202508	2	PSW1	8P-2021

SC-701VA POWER UNIT CHASSIS PARTS-1

SC-701VA		5620062	2	FUSE	SAU-4A
SC-701VA		5625404	2	FH	FEK 031.1661 Cap

SC-701VE POWER UNIT CHASSIS PARTS-1

SC-701VE		5621079	2	FUSE	179 120-2A
SC-701VE		5625413	2	FH	FEK 031.1663 Cap

SC-701VG POWER UNIT CHASSIS PARTS-1

SC-701VG		5621079	2	FUSE	179 120-2A
SC-701VG		5625413	2	FH	FEK 031.1663 Cap

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

SC-701VH POWER UNIT CHASSIS PARTS-1

SC-701VH		5621079	2	FUSE 179 120-2A
SC-701VH		5625413	2	FH FEK 031.1663 Cap

SC-701VJ POWER UNIT CHASSIS PARTS-1

SC-701VJ		5620062	2	FUSE SAU-4A
SC-701VJ		5625404	2	FH FEK 031.1661 Cap

SC-701VK POWER UNIT CHASSIS PARTS-1

SC-701VK		5621079	2	FUSE 179 120-2A
SC-701VK		5625413	2	FH FEK 031.1663 Cap

SC-701VR POWER UNIT CHASSIS PARTS-1

SC-701VR		5621079	2	FUSE 179 120-2A
SC-701VR		5625413	2	FH FEK 031.1663 Cap

SC-703X POWER UNIT CHASSIS PARTS-2

SC-703X		3280111	1	SW SS-5GL2
SC-703X		5500922	1	CORD 170187-2 (300) Red
SC-703X		5500931	1	CORD 170187-2 (300) Black
SC-703X		5500949	1	CORD 171822-2 2P with Cord

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

SC-704X POWER UNIT CHASSIS PARTS-2

SC-704X		3280111	1	SW SS-5GL2
SC-704X		5500922	1	CORD 170187-2 (300) Red
SC-704X		5500931	1	CORD 170187-2 (300) Black
SC-704X		5500949	1	CORD 171822-2 2P with Cord

TEC7000X CHASSIS PARTS-1

TEC7000X		3790149	1	T D/D Converter SWH-5042Y
TEC7000X	CNP105	5427583	1	PCN M62-1503038SA-1 (20)
TEC7000X	CNP106	5500869	1	CORD HIF3A5B-40D-AC(10)
TEC7000X	CNP355	5500806	1	CORD Paddle ECG Connection Cable
TEC7000X	CNP607	5427467	1	PCN M62-12-3039SA (10)
TEC7000X	CNP610	5421018	1	ACN1 A3-705B-00J 3P PLUG FEMALE
TEC7000X	CNP751	5500887	1	CORD HIF3A-34D-AC(5)
TEC7000X		2000586	1	CRT CRT140CYB31
TEC7000X	CNP600	3793226	1	YOKE YS-33276E with Cord
TEC7000X	CNP620	5500789	1	CORD CRT CORD 9P with Connector
TEC7000X		3400286	1	RY HV Relay NKR-203 12V/3OHM
TEC7000X		3751138	1	CH NKL-201 28uH TTR
TEC7000X	CNP535	5500833	1	CORD HV Cable 41898(250) Red
TEC7000X	CNP545	5500842	1	CORD HV Cable 41898(180) White
TEC7000X	CNP565	5500815	1	CORD HV Cable 41898(150) Red

UP-7596 TEST DETECT BD

UP-7596	CNP555	5500798	1	CORD CORD for TEST LOAD
UP-7596	PC580	0600263	1	TRP PC-827 PHOTOCOUPLER DUAL

UP-7596G TEST DETECT BD

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7596G	CNP555	5500798	1	CORD CODE for TEST LOAD
UP-7596G	PC580	0600263	1	TRP PC-827 PHOTOCOUPLER DUAL

UP-7635 ECG/CPU BD

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7635	CNJ100	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-7635	CNJ101	5445474	1	PCN IL-2P-S3FP2-1
UP-7635	CNJ105	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7635	CNJ106	5427173	1	PCN HIF3F-40PADSA 40P
UP-7635	CNJ108	5425139	1	PCN HKP-22MS-11BT
UP-7635	CNJ110	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-7635	CNJ157	5427743	1	PCN HIF3F-34PA-2.54DSA
UP-7635	CNJ303	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7635	CNJ355	5427636	1	PCN M60-03-30-114P STRAIGHT
UP-7635	C100	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	C103-C109	4317525	7	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	C111	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	C112	3820768	1	FLC1 454M6302 104K
UP-7635	C113	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	C120	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7635	C121	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7635	C122	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-7635	C123	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7635	C124	4315082	1	FLC1 ECQ-B 1H 222JZ3 0.0022uF
UP-7635	C125-C126	3839793	2	FLC1 ECQ-V1H224JZ 0.22uF
UP-7635	C127	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7635	C128	4315206	1	FLC1 ECQ-B 1H 223JZ3 0.022uF
UP-7635	C129	4317623	1	CEC2 DD05-989B 331K500 (330pF)
UP-7635	C130	4317614	1	CEC2 DD05-989B 221K500 (220pF)
UP-7635	C151	4317552	1	CEC2 DD05-989SL 220K500 (22pF)
UP-7635	C152	3890353	1	ECR-GA035M11-35pF
UP-7635	C153	3839837	1	FLC1 ECQ-V1H474JZ 0.47uF
UP-7635	C201-C206	4315304	6	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-7635	C207-C210	4315162	4	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-7635	C211-C220	4315304	10	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-7635	C230	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7635	C231	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7635	C232	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7635	C233	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-7635	C234	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-7635	C241-C242	4315046	2	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-7635	C243	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7635	C250-C251	3839873	2	FLC1 ECQ-V1H105JZ 1.0uF
UP-7635	C252	4315269	1	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-7635	C253	4317641	1	CEC2 DD06-999B 681K500 (680pF)
UP-7635	C254	3824461	1	MPC ECQ-V1H 154JZ 50V 0.15uF
UP-7635	C255	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-7635	C256	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-7635	C257-C270	4315304	14	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-7635	C271-C272	3800219	2	EC04 ECEA1CS470 16V47uF
UP-7635	C273	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7635	C274	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7635	C275	4315269	1	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-7635	C301-C304	4315046	4	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-7635	C305	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-7635	C306	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-7635	C307	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7635	C309-C310	3800371	2	EC04 ECEA1VS100 35V10uF
UP-7635	C311	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-7635	C312	4315287	1	FLC1 ECQ-V 1H 683JZ3 (0.068uF)
UP-7635	C351-C352	4315162	2	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-7635	C353	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7635	C354	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-7635	C355-C356	3800371	2	EC04 ECEA1VS100 35V10uF
UP-7635	C381-C382	3839793	2	FLC1 ECQ-V1H224JZ 0.22uF
UP-7635	C383	3810832	1	TC04 204M3502 105M4 (1uF/35V)
UP-7635	C384	4315269	1	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-7635	C385	4315242	1	FLC1 ECQ-V 1H 333JZ3 (0.033uF)
UP-7635	C386-C387	4317525	2	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	C401	4317614	1	CEC2 DD05-989B 221K500 (220pF)
UP-7635	C402-C407	4317525	6	CEC1 TP D55Y5V1H 104Z 5-W
UP-7635	DA101	0950571	1	D MA430
UP-7635	DA102	0800582	1	D Diode Array DAN 401
UP-7635	DA103	0800573	1	D Diode Array DAP 401
UP-7635	DA104	0800582	1	D Diode Array DAN 401
UP-7635	DA105	0800573	1	D Diode Array DAP 401
UP-7635	DA231	0800573	1	D Doide Array DAP 401
UP-7635	DA232	0800582	1	D Diode Array DAN 401
UP-7635	DA233	0800573	1	D Diode Array DAP 401

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-7635	D100-D106	4322528	7	D	1S2076ARE
UP-7635	D151-D153	4322528	3	D	1S2076ARE
UP-7635	D201-D216	0800564	16	D	1SS237
UP-7635	D217-D218	4322528	2	D	1S2076ARE
UP-7635	D219	0800564	1	D	1SS237
UP-7635	D220-D225	4322528	6	D	1S2076ARE
UP-7635	D230-D231	4322528	2	D	1S2076ARE
UP-7635	D232	0800092	1	D	0A91(1S1005)
UP-7635	D241-D242	4322528	2	D	1S2076ARE
UP-7635	D253-D259	4322528	7	D	1S2076ARE
UP-7635	D301-D302	4322528	2	D	1S2076ARE
UP-7635	D303-D304	4327612	2	ZD2	HZ9C1RE (8.9-9.3V)
UP-7635	D305-D314	0800644	10	D	1SV126
UP-7635	D351-D354	4322528	4	D	1S2076ARE
UP-7635	D355-D356	4327612	2	ZD2	HZ9C1RE (8.9-9.3V)
UP-7635	D357-D358	4322528	2	D	1S2076ARE
UP-7635	D381-D382	4322528	2	D	1S2076ARE
UP-7635	D401	4322528	1	D	1S2076ARE
UP-7635	GA351	2100335	1	GA	B1C90 (90V)
UP-7635	ICS103	5422846	1	SOKT	IC SOCKET DL-2-28A (01)
UP-7635	ICS107	5601279	1	SOKT	208-93-764 64PIC SOCKET
UP-7635	ICS201	5601279	1	SOKT	208-93-764 64PIC SOCKET
UP-7635	ICS203	5422846	1	SOKT	IC SOCKET DL-2-28A (01)
UP-7635	ICS405	5601279	1	SOKT	208-93-764 64PIC SOCKET
UP-7635	IC101	1205786	1	CPU	uPD71055C(82C55A-2)
UP-7635	IC102	1302859	1	CPU	uPD8279C-2
UP-7635	IC104	1302984	1	MIC	uPD74HC138C(HD74HC138P)
UP-7635	IC105	1253403	1	AIC	TL7700C
UP-7635	IC106	1303528	1	MIC	uPD74HC123C(HD74HC123P)
UP-7635	IC107	1205768	1	CPU	HD63B03XP
UP-7635	IC108	1303074	1	MIC	uPD74HC4040C(HD74HC4040P
UP-7635	IC109	1302948	1	MIC	uPD74HC08C(HD74HC08P)
UP-7635	IC110	1302975	1	MIC	HD74HC32P(uPD74HC32C)
UP-7635	IC112	1203752	1	TIC	SN74LS365
UP-7635	IC114	1252752	1	OPIC	HA17082PS 2FET
UP-7635	IC115	1302948	1	MIC	uPD74HC08C(HD74HC08P)
UP-7635	IC116	1302912	1	MIC	HD74HC00P(uPD74HC00C)
UP-7635	IC151	1303662	1	CPU	MSM6242 RS
UP-7635	IC201	1205768	1	CPU	HD63B03XP
UP-7635	IC202	1253501	1	ADIC	uPD-7004C8CH10BITA/D
UP-7635	IC204	1206473	1	CPU	MB84256-10LP-G
UP-7635	IC205	1303065	1	MIC	HD74HC245P(uPD74HC245C)
UP-7635	IC206-IC207	1303056	2	MIC	HD74HC244P(uPD74HC244C)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7635	IC208	1302912	1	MIC HD74HC00P(uPD74HC00C)
UP-7635	IC209	1302939	1	MIC HD74HC04P(uPD74HC04C)
UP-7635	IC230	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7635	IC250	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7635	IC251	1601875	1	MD NP2014B
UP-7635	IC252	1300611	1	MIC HD14051BP(MC14051BCP)
UP-7635	IC253	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7635	IC254-IC255	1253118	2	OPIC uPC324C QUAD
UP-7635	IC256	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-7635	IC257	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7635	IC258	1252084	1	OPIC TL072CP
UP-7635	IC301-IC302	1252084	2	OPIC TL072CP
UP-7635	IC303-IC305	1300611	3	MIC HD14051BP(MC14051BCP)
UP-7635	IC306	1253724	1	OPIC uPC4570C
UP-7635	IC307	1251165	1	OPIC uPC1458C
UP-7635	IC308	1251904	1	AIC MB4204 (uPC339C)
UP-7635	IC309	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7635	IC351	1252084	1	OPIC TL072CP
UP-7635	IC352	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7635	IC380	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7635	IC381	1252752	1	OPIC HA17082PS 2FET
UP-7635	IC401-IC402	1303056	2	MIC HD74HC244P(uPD74HC244C)
UP-7635	IC403	1303065	1	MIC HD74HC245P(uPD74HC245C)
UP-7635	IC404	1204902	1	CPU HM6264LP-15(uPD4364C-15L
UP-7635	IC406	1251174	1	ADIC uPC624C (DAC-08CQ)
UP-7635	IC408	1300522	1	MIC HD14042BP (MC14042BCP)
UP-7635	IC409	1303546	1	MIC HD74HC151P (uPD74HC151C)
UP-7635	IC410	1303074	1	MIC uPD74HC4040C(HD74HC4040P
UP-7635	IC411	1302921	1	MIC uPD74HC02C(HD74HC02P)
UP-7635	IC412	1303412	1	MIC SN74HC03N(uPD74HC03C)
UP-7635	PC301	0600254	1	TRP PC837
UP-7635	PC302	1704345	1	TRP PC817 PHOTOCOUPLER
UP-7635	Q230-Q231	4335069	2	TRC 2SC1213AKDTZ
UP-7635	Q240-Q241	4335069	2	TRC 2SC1213AKDTZ
UP-7635	Q250	4330038	1	TRA 2SA495GTM-Y,TPE2
UP-7635	Q251	4335069	1	TRC 2SC1213AKDTZ
UP-7635	RA100	4090582	1	RM EXB-P84-103J
UP-7635	RA101	4090813	1	RM EXB-P88-103J
UP-7635	RA102-RA103	4090582	2	RM EXB-P84-103J
UP-7635	RA104	4090813	1	RM EXB-P88-103J
UP-7635	RA105-RA106	4091153	2	RM EXB-T44-101J
UP-7635	RA201-RA202	4092624	2	RM EXB-T44-472J 4.7 KOHM
UP-7635	RA203	4090822	1	RM EXB-P88-472J

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7635	RA204	4090787	1	RM EXB-P88-104J
UP-7635	RA206	4090813	1	RM EXB-P88-103J
UP-7635	RA230	4091884	1	RM EXB-P84-472J
UP-7635	RA301	4093338	1	RM CMR-042B 20.0K OHM
UP-7635	RA302	4093347	1	RM CMR-042A 30.1K OHM
UP-7635	RA303	4090689	1	RM EXB-P84-473J
UP-7635	RA304	4093356	1	RM EXB-F8V-154J
UP-7635	RA305-RA306	4091572	2	RM EXB-T44-103J
UP-7635	RA401	4090813	1	RM EXB-P88-103J
UP-7635	SW100	3352168	1	SW DSS 104
UP-7635	SW102	3350838	1	DSW DSS102
UP-7635	T301	3772285	1	PLTF EP17 50KHZ SIG Yellow
UP-7635	T302	3772267	1	PLTF EP17 50KHZ DC-DC red
UP-7635	T351	3772258	1	PLTF EP13 50KHZ SIG Yellow
UP-7635	T352	3772276	1	PLTF EP13 50KHZ DC-DC Red
UP-7635	T381	3772258	1	PLTF EP13 50KHZ SIG Yellow
UP-7635	VR101	4160685	1	TPOT GF06P 100KOHM
UP-7635	VR251	4160596	1	TPOT GF06P 1KOHM
UP-7635	VR252	4160667	1	TPOT GF06P 20KOHM
UP-7635	VR253	4160827	1	TPOT GF06P 500KOHM
UP-7635	VR254	4160667	1	TPOT GF06P 20KOHM
UP-7635	VR255	4160604	1	TPOT GF06P 5KOHM
UP-7635	VR381	4160827	1	TPOT GF06P 500KOHM
UP-7635	X100	1750927	1	XTAL TD308C(XCO-B)8MHZ
UP-7635	X151	1702597	1	XTAL KF38G 32.768KHZ
UP-7635	ZD250	1253519	1	REG LT1009CZ 2.5VREF
UP-7635	ZD251	1090329	1	ZD2 HZ6C1 6V

UP-7636 HIGH VOLTAGE BD

UP-7636		5491361	1	CHEM HEAT SINK SHEET TO-3P2 TC30AG(F-1)
UP-7636	CNJ501	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7636	CNJ511	5414864	1	NCN 350543-1 4P
UP-7636	CNJ515	5424024	1	NCN 171825-2 Receptacle Male
UP-7636	CNJ525	5424033	1	NCN 171825-3 Receptacle Male
UP-7636	CNJ535	5427734	1	PCN 170267-1
UP-7636	CNJ545	5427734	1	PCN 170267-1
UP-7636	CNJ555	5427681	1	PCN M60-03-30-134
UP-7636	C500	3851146	1	CEC2 DD05B471K500 500V470pF
UP-7636	C501	3800469	1	EC04 ECEA1HS010 50V1uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7636	C502	3839605	1	FLC1 ECQ-B1H472JZ 0.0047uF
UP-7636	C503	3801245	1	EC04 ECEA1VU 102
UP-7636	C504	3800193	1	EC04 ECEA1CS100 16V10uF
UP-7636	C505	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7636	C506	3800237	1	EC04 ECEA1CS221 16V220uF
UP-7636	C507	3801414	1	EC04 ECES1EU682G 25V6800uF
UP-7636	C509	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7636	C510	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7636	C514	3859147	1	CEC2 10MDQ222M
UP-7636	C515	3839605	1	FLC1 ECQ-B1H472JZ 0.0047uF
UP-7636	C516	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-7636	C517-C520	3839757	4	FLC1 ECQ-V1H104JZ 0.1uF
UP-7636	C721	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7636	C722-C723	3810502	2	TC04 ECSZ35HS6R8(242M3502-685M
UP-7636	C724	3839703	1	FLC1 ECQ-V1H333JZ 0.033uF
UP-7636	C725	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7636	D500-D502	4322528	3	D 1S2076ARE
UP-7636	D503-D504	0910008	2	DP SR1FM8 800mA 400V
UP-7636	D506-D509	4322528	4	D 1S2076ARE
UP-7636	D510-D513	1101006	4	DP RC2 2007A 2KV
UP-7636	D515	0910008	1	DP SR1FM8 800mA 400V
UP-7636	D517	0910008	1	DP SR1FM8 800mA 400V
UP-7636	D518-D522	4322528	5	D 1S2076ARE
UP-7636	D720-D721	4322528	2	D 1S2076ARE
UP-7636	IC501	1253047	1	REG TL494CN SW REG
UP-7636	IC502	1300112	1	MIC MC14001UBCP (CD4001UBE)
UP-7636	IC503	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7636	IC504	1253109	1	OPIC uPC358C DUAL
UP-7636	IC505	1253706	1	REG HA17806P Regulator
UP-7636	IC506	1252449	1	REG MC7906CT
UP-7636	IC720	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-7636	L501-L502	3788009	2	L LF1-101K
UP-7636	Q500	0400568	1	TRD 2SD1271
UP-7636	Q501	0200499	1	TRB 2SB946
UP-7636	Q502	0400621	1	TRD 2SD1038
UP-7636	Q503	0400434	1	TRD 2SD571 L or M
UP-7636	Q504-Q506	0300596	3	TRC 2SC1345K-D(2SC1707H-C)
UP-7636	Q507	0200499	1	TRB 2SB946
UP-7636	RLY501	3430707	1	RY HV Relay NKR-102 8KV 80mA
UP-7636	T500	3790167	1	FBTF T-3790167 HV-DD
UP-7636	VR500	4160667	1	TPOT GF06P 20KOHM
UP-7636	VR501	4160658	1	TPOT GF06P 500 OHM
UP-7636	VR720	4160685	1	TPOT GF06P 100KOHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-7636	VR721	4160613	1	TPOT	GF06P 10KOHM

UP-7638 FRONT PANEL BD

UP-7638		5415551	2	NCN	Pin 170204-2
UP-7638		5424078	1	NCN	171822-2 PLUG FEMALE
UP-7638	CNJ750	5422276	1	PCN	HKP-14MS-7BT
UP-7638	CNJ751	5427957	1	PCN	HIF3F34PA-2.5DS
UP-7638	CNJ752	5427645	1	PCN	M60-06-30-114P STRAIGHT
UP-7638	CNJ753	5427752	1	PCN	FH3-10S-1.25DS
UP-7638	CNP752	5427609	1	PCN	M62-06-0004SA (30)
UP-7638	C750	3800415	1	EC04	ECEA1VS101 35V100uF
UP-7638	C751	3800219	1	EC04	ECEA1CS470 16V47uF
UP-7638	C752	3820768	1	FLC1	454M6302 104K
UP-7638	DA750	0950571	1	D	MA430
UP-7638	IC750	1203975	1	TR	TD62004P
UP-7638	IC751	1205759	1	TIC	SN74LS07
UP-7638	LED750	1102139	1	LED	TLY 253 Yellow
UP-7638	LED751	1102148	1	LED	TLO 253 Orange
UP-7638	LED752-LED753	1102121	2	LED	TLG 253 Green
UP-7638	LED754	1102139	1	LED	TLY 253 Yellow
UP-7638	LED755-LED756	1102121	2	LED	TLG 253 Green
UP-7638	RA751	4093196	1	RM	EXB-F8V 103J 10K
UP-7638	RA752	4093365	1	RM	EXB-F8V-391J
UP-7638	RA753	4090831	1	RM	EXB-T44-102J
UP-7638	RA754	4093374	1	RM	EXB-F8V-223J
UP-7638	SW750-SW751	3280272	2	SW	KHC-10903
UP-7638	SW752	3352524	1	DSW	SRRS 1-18
UP-7638	TR750-TR757	0200507	8	TRB	2SB561C

UP-7639 VR AND CONNECTOR BD

UP-7639	CNJ702-CNJ703	5430721	2	CN	LGY 6501-0101
UP-7639	CNP011	5427431	1	PCN	M62-12-0017SA (30)
UP-7639	VR701	4161523	1	TVR2	RV16YP15S 500K OHM
UP-7639	VR702	4161532	1	TVR2	RV16YP15S 100 OHM

UP-7640 SW REGULATOR

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7640		5415836	2	NCN 5167PBTL
UP-7640		5601314	4	SOKT F4034P FUSE HOLDER
UP-7640		5601323	2	SOKT RT807
UP-7640	CNJ801	5428065	1	PCN 5281-03A 3P
UP-7640	CNJ802-CNJ803	5427734	2	PCN 170267-1
UP-7640	CNJ804	5425139	1	PCN HKP-22MS-11BT
UP-7640	CNJ805	5414864	1	NCN 350543-1 4P
UP-7640	CNJ806-CNJ807	5427734	2	PCN 170267-1
UP-7640	CNJ808	5424024	1	NCN 171825-2 Receptacle Male
UP-7640	CNJ809	5424033	1	NCN 171825-3 Receptacle Male
UP-7640	CNP801	5428074	1	PCN 5258-03 3P
UP-7640	CNP802	5500922	1	CORD 170187-2 (300) Red
UP-7640	CNP804	5424924	1	PCN HKP22FS02-11BT(20)
UP-7640	CNP805	5500967	1	CORD 1-480722-0 (350)
UP-7640	CN801	1601866	1	TH SUP-B3G-E-2A LINEFILTER
UP-7640	C801-C802	3820901	2	FLC2 ECQ-U2A224MN
UP-7640	C803-C804	3801601	2	EC04 KM200VRSN560-35C
UP-7640	C805	3820893	1	FLC DAD2E 105K
UP-7640	C806	3801593	1	EC04 KME25VB47 25/47
UP-7640	C807	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7640	C808	3801495	1	EC04 KME35VB470 35/470
UP-7640	C809	3853304	1	CEC2 ECK-D3D102KBN 1000pF 2KV
UP-7640	C810-C812	3801486	3	EC04 KME25VB2200 25/2200
UP-7640	C813	3801512	1	EC04 ECEA1HG010S 50V1uF
UP-7640	C814-C815	3801593	2	EC04 KME25VB47 25/47
UP-7640	C816	3820884	1	FLC QYA 2A103K
UP-7640	C817	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7640	C818-C820	3801619	3	EC04 KME16VB1000 16/1000
UP-7640	C821	3801459	1	EC04 KME25VB-1000 1000uF
UP-7640	C822-C828	3801593	7	EC04 KME25VB47 25/47
UP-7640	C829	3801495	1	EC04 KME35VB470 35/470
UP-7640	C830	3801486	1	EC04 KME25VB2200 25/2200
UP-7640	C831	3801593	1	EC04 KME25VB47 25/47
UP-7640	C832	3801628	1	EC04 KME35VB1000 35/1000
UP-7640	C833-C834	3820884	2	FLC QYA 2A103K
UP-7640	C835	3801593	1	EC04 KME25VB47 25/47
UP-7640	C836	3820884	1	FLC QYA 2A103K
UP-7640	C837	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7640	C838	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7640	C839	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-7640	D801	0940484	1	DB	S4VB60
UP-7640	D802	1000525	1	ZD2	HZ12LB-2 (12.85V)
UP-7640	D803-D804	0910659	2	DP	V19G (1.0A 600V)
UP-7640	D805-D808	0910597	4	DP	V19C (1A200V 200NS)
UP-7640	D809	0940475	1	DB	S24LCA20
UP-7640	D810	1090187	1	ZD2	HZ9LC1
UP-7640	D811	0910597	1	DP	V19C (1A200V 200NS)
UP-7640	D812-D813	0800617	2	DP	1SS81
UP-7640	D814-D825	0910597	12	DP	V19C (1A200V 200NS)
UP-7640	D826	0800617	1	DP	1SS81
UP-7640	D827-D829	0800626	3	D	U19C
UP-7640	D830	0800617	1	DP	1SS81
UP-7640	D831	0910659	1	DP	V19G (1.0A 600V)
UP-7640	D832-D835	0800617	4	DP	1SS81
UP-7640	D836	1090258	1	ZD2	HZ6LB1
UP-7640	D837	0800617	1	DP	1SS81
UP-7640	FH801-FH802	5625396	2	FH	FEU 031.1681
UP-7640	F803-F806	5620846	4	FUSE	MC-3 (3A125V)
UP-7640	F807-F808	5620659	2	FUSE	F-1065 15A
UP-7640	IC801-IC802	1601893	2	MD	SWC-01
UP-7640	IC803	1302315	1	MIC	HD14011BP(MC14011BCP)
UP-7640	IC804	1302298	1	MIC	HD14001BP(MC14001BCP)
UP-7640	IC805	1250219	1	REG	HA17723 (723CJ.Yellow)
UP-7640	IC806	1251316	1	OPIC	uPC271C
UP-7640	IC807	1253706	1	REG	HA17806P Regulator
UP-7640	IC808	1252449	1	REG	MC7906CT
UP-7640	IC809	1253822	1	REG	HA178M12
UP-7640	L801-L802	3751183	2	CH	SKP-5-80
UP-7640	L803	3750986	1	CH	LH3-332K (3.3mH)
UP-7640	L804	3751192	1	CH	SKL-204
UP-7640	L805-L807	3751165	3	CH	LH3 102K 1000uH
UP-7640	L808	3751174	1	CH	LH3 222K 2200uH
UP-7640	L809-L810	3799505	2	L	LH5-102K 1mH
UP-7640	L812-L813	3788811	2	L	2643-000301
UP-7640	Q801	0400648	1	TRD	2SD799
UP-7640	Q802-Q803	0302504	2	TRC	2SC4237
UP-7640	Q804-Q805	0101445	2	TRA	2SA1020
UP-7640	Q806	0302433	1	TRC	2SC2324K
UP-7640	Q807-Q808	0101454	2	TRA	2SA1293
UP-7640	Q809	0101151	1	TRA	2SA1194K HFE;1000
UP-7640	Q810	0301853	1	TRC	2SC1815
UP-7640	Q811	0302219	1	TRC	2SC2562 O or Y
UP-7640	Q812	0101196	1	TRA	2SA1015

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7640	Q813	0950598	1	SCR SF0R1B42 (0.1A100V)
UP-7640	RY801-RY802	3400277	2	RY MC12D1-0
UP-7640	R805	4093525	1	RM RGD5-2 470OHM
UP-7640	SW801	3250367	1	SW JPZ2120-0101
UP-7640	TH801-TH802	1705932	2	TH 5D-11
UP-7640	TH803	1705941	1	TH 2KD-5 25 C 2K
UP-7640	T801	3772294	1	PLTF PT7331A
UP-7640	T802	3772302	1	PLTF PT7332
UP-7640	T803-T804	3772311	2	PLTF PT7333
UP-7640	VR801	4160604	1	TPOT GF06P 5KOHM
UP-7640	VR802	4160792	1	TPOT GF06P 200 OHM
UP-7640	VR803	4160596	1	TPOT GF06P 1KOHM
UP-7640	VR804	4160792	1	TPOT GF06P 200 OHM
UP-7640	VR805-VR806	4160613	2	TPOT GF06P 10KOHM

UP-7682 DIP SW BD

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7682		5430721	1	CN LGY 6501-0101
UP-7682	CNP001	5427431	1	PCN M62-12-0017SA (30)
UP-7682	C700	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7682	SW701	3250376	1	SW BP-8 8DIP

UP-7720 SW REGULATOR

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7720		5415836	2	NCN 5167PBTL
UP-7720		5601314	4	SOKT F4034P FUSE HOLDER
UP-7720		5601323	2	SOKT RT807
UP-7720	CNJ801	5428065	1	PCN 5281-03A 3P
UP-7720	CNJ802-CNJ803	5427734	2	PCN 170267-1
UP-7720	CNJ804	5425139	1	PCN HKP-22MS-11BT
UP-7720	CNJ805	5414864	1	NCN 350543-1 4P
UP-7720	CNJ806-CNJ807	5427734	2	PCN 170267-1
UP-7720	CNJ808	5424024	1	NCN 171825-2 Receptacle Male
UP-7720	CNJ809	5424033	1	NCN 171825-3 Receptacle Male
UP-7720	CNP801	5428074	1	PCN 5258-03 3P
UP-7720	CNP802	5500922	1	CORD 170187-2 (300) Red
UP-7720	CNP804	5424924	1	PCN HKP22FS02-11BT(20)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7720	CNP805	5500967	1	CORD 1-480722-0 (350)
UP-7720	CN801	1601866	1	TH SUP-B3G-E-2A LINEFILTER
UP-7720	C801-C802	3820901	2	FLC2 ECQ-U2A224MN
UP-7720	C803-C804	3801601	2	EC04 KM200VRSN560-35C
UP-7720	C805	3820893	1	FLC DAD2E 105K
UP-7720	C806	3801593	1	EC04 KME25VB47 25/47
UP-7720	C807	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720	C808	3801495	1	EC04 KME35VB470 35/470
UP-7720	C809	3853304	1	CEC2 ECK-D3D102KBN 1000pF 2KV
UP-7720	C810-C812	3801486	3	EC04 KME25VB2200 25/2200
UP-7720	C813	3801512	1	EC04 ECEA1HG010S 50V1uF
UP-7720	C814-C815	3801593	2	EC04 KME25VB47 25/47
UP-7720	C816	3820884	1	FLC QYA 2A103K
UP-7720	C817	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720	C818-C820	3801619	3	EC04 KME16VB1000 16/1000
UP-7720	C821	3801459	1	EC04 KME25VB-1000 1000uF
UP-7720	C822-C828	3801593	7	EC04 KME25VB47 25/47
UP-7720	C829	3801495	1	EC04 KME35VB470 35/470
UP-7720	C830	3801486	1	EC04 KME25VB2200 25/2200
UP-7720	C831	3801593	1	EC04 KME25VB47 25/47
UP-7720	C832	3801628	1	EC04 KME35VB1000 35/1000
UP-7720	C833-C834	3820884	2	FLC QYA 2A103K
UP-7720	C835	3801593	1	EC04 KME25VB47 25/47
UP-7720	C836	3820884	1	FLC QYA 2A103K
UP-7720	C837	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7720	C838	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720	C839	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7720	C841	3820919	1	FLC QYA2A472K
UP-7720	C842	3820884	1	FLC QYA 2A103K
UP-7720	C843	3801593	1	EC04 KME25VB47 25/47
UP-7720	D801	0940484	1	DB S4VB60
UP-7720	D802	1000525	1	ZD2 HZ12LB-2 (12.85V)
UP-7720	D803-D804	0910659	2	DP V19G (1.0A 600V)
UP-7720	D805-D808	0910597	4	DP V19C (1A200V 200NS)
UP-7720	D809	0940475	1	DB S24LCA20
UP-7720	D810	1090187	1	ZD2 HZ9LC1
UP-7720	D811	0910597	1	DP V19C (1A200V 200NS)
UP-7720	D812-D813	0800617	2	DP 1SS81
UP-7720	D814-D825	0910597	12	DP V19C (1A200V 200NS)
UP-7720	D826	0800617	1	DP 1SS81
UP-7720	D827-D829	0800626	3	D U19C
UP-7720	D830	0800617	1	DP 1SS81
UP-7720	D831	0910659	1	DP V19G (1.0A 600V)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-7720	D832-D835	0800617	4	DP	1SS81
UP-7720	D836	1090258	1	ZD2	HZ6LB1
UP-7720	D837	0800617	1	DP	1SS81
UP-7720	FH801-FH802	5625396	2	FH	FEU 031.1681
UP-7720	F803-F806	5620846	4	FUSE	MC-3 (3A125V)
UP-7720	F807-F808	5620659	2	FUSE	F-1065 15A
UP-7720	IC801-IC802	1601893	2	MD	SWC-01
UP-7720	IC803	1302315	1	MIC	HD14011BP(MC14011BCP)
UP-7720	IC804	1302298	1	MIC	HD14001BP(MC14001BCP)
UP-7720	IC805	1250219	1	REG	HA17723 (723CJ.G)
UP-7720	IC806	1251316	1	OPIC	uPC271C
UP-7720	IC807	1253706	1	REG	HA17806P Regulator
UP-7720	IC808	1252449	1	REG	MC7906CT
UP-7720	IC809	1253822	1	REG	HA178M12
UP-7720	L801-L802	3751183	2	CH	SKP-5-80
UP-7720	L803	3750986	1	CH	LH3-332K (3.3mH)
UP-7720	L804	3751192	1	CH	SKL-204
UP-7720	L805-L807	3751165	3	CH	LH3 102K 1000uH
UP-7720	L808	3751174	1	CH	LH3 222K 2200uH
UP-7720	L809-L810	3799505	2	L	LH5-102K 1mH
UP-7720	L811	3788829	1	L	BL02RN2-R62
UP-7720	L812-L813	3788811	2	L	2643-000301
UP-7720	L814-L815	3788829	2	L	BL02RN2-R62
UP-7720	Q801	0400648	1	TRD	2SD799
UP-7720	Q802-Q803	0302255	2	TRC	2SC2792
UP-7720	Q804-Q805	0101445	2	TRA	2SA1020
UP-7720	Q806	0302433	1	TRC	2SC2324K
UP-7720	Q807-Q808	0101454	2	TRA	2SA1293
UP-7720	Q809	0101151	1	TRA	2SA1194K HFE;1000
UP-7720	Q810	0301853	1	TRC	2SC1815
UP-7720	Q811	0302219	1	TRC	2SC2562 O or Y
UP-7720	Q812	0101196	1	TRA	2SA1015
UP-7720	Q813	0950598	1	SCR	SF0R1B42 (0.1A100V)
UP-7720	RY801-RY802	3400277	2	RY	MC12D1-0
UP-7720	R805	4093525	1	RM	RGD5-2 470OHM
UP-7720	SW801	3250367	1	SW	JPZ2120-0101
UP-7720	TH801-TH802	1705932	2	TH	5D-11
UP-7720	TH803	1705941	1	TH	2KD-5 25 C 2K
UP-7720	T801	3772347	1	T	PT36271A
UP-7720	T802	3772302	1	PLTF	PT7332
UP-7720	T803-T804	3772311	2	PLTF	PT7333
UP-7720	VR801	4160604	1	TPOT	GF06P 5KOHM
UP-7720	VR802	4160792	1	TPOT	GF06P 200 OHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7720	VR803	4160596	1	TPOT GF06P 1KOHM
UP-7720	VR804	4160792	1	TPOT GF06P 200 OHM
UP-7720	VR805-VR806	4160613	2	TPOT GF06P 10KOHM
UP-7720	VR807	4160676	1	TPOT GF06P 50KOHM

UP-7720G SW REGULATOR

UP-7720G		5415836	2	NCN 5167PBTL
UP-7720G		5601314	4	SOKT F4034P FUSE HOLDER
UP-7720G		5601323	2	SOKT RT807
UP-7720G	CNJ801	5428065	1	PCN 5281-03A 3P
UP-7720G	CNJ802-CNJ803	5427734	2	PCN 170267-1
UP-7720G	CNJ804	5425139	1	PCN HKP-22MS-11BT
UP-7720G	CNJ805	5414864	1	NCN 350543-1 4P
UP-7720G	CNJ806-CNJ807	5427734	2	PCN 170267-1
UP-7720G	CNJ808	5424024	1	NCN 171825-2 Receptacle Male
UP-7720G	CNJ809	5424033	1	NCN 171825-3 Receptacle Male
UP-7720G	CNP801	5428074	1	PCN 5258-03 3P
UP-7720G	CNP802	5500922	1	CORD 170187-2 (300) Red
UP-7720G	CNP804	5424924	1	PCN HKP22FS02-11BT(20)
UP-7720G	CNP805	5500967	1	CORD 1-480722-0 (350)
UP-7720G	CN801	1601866	1	TH SUP-B3G-E-2A LINEFILTER
UP-7720G	C801-C802	3820901	2	FLC2 ECQ-U2A224MN
UP-7720G	C803-C804	3801601	2	EC04 KM200VRSN560-35C
UP-7720G	C805	3820893	1	FLC DAD2E 105K
UP-7720G	C806	3801593	1	EC04 KME25VB47 25/47
UP-7720G	C807	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720G	C808	3801495	1	EC04 KME35VB470 35/470
UP-7720G	C809	3853304	1	CEC2 ECK-D3D102KBN 1000pF 2KV
UP-7720G	C810-C812	3801486	3	EC04 KME25VB2200 25/2200
UP-7720G	C813	3801512	1	EC04 ECEA1HG010S 50V1uF
UP-7720G	C814-C815	3801593	2	EC04 KME25VB47 25/47
UP-7720G	C816	3820884	1	FLC QYA 2A103K
UP-7720G	C817	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720G	C818-C820	3801619	3	EC04 KME16VB1000 16/1000
UP-7720G	C821	3801459	1	EC04 KME25VB-1000 1000uF
UP-7720G	C822-C828	3801593	7	EC04 KME25VB47 25/47
UP-7720G	C829	3801495	1	EC04 KME35VB470 35/470
UP-7720G	C830	3801486	1	EC04 KME25VB2200 25/2200
UP-7720G	C831	3801593	1	EC04 KME25VB47 25/47

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7720G	C832	3801628	1	EC04 KME35VB1000 35/1000
UP-7720G	C833-C834	3820884	2	FLC QYA 2A103K
UP-7720G	C835	3801593	1	EC04 KME25VB47 25/47
UP-7720G	C836	3820884	1	FLC QYA 2A103K
UP-7720G	C837	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7720G	C838	3801503	1	EC04 KME50VB4.7 50/4.7
UP-7720G	C839	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7720G	C841	3820919	1	FLC QYA2A472K
UP-7720G	C842	3820884	1	FLC QYA 2A103K
UP-7720G	C843	3801593	1	EC04 KME25VB47 25/47
UP-7720G	D801	0940484	1	DB S4VB60
UP-7720G	D802	1000525	1	ZD2 HZ12LB-2 (12.85V)
UP-7720G	D803-D804	0910659	2	DP V19G (1.0A 600V)
UP-7720G	D805-D808	0910597	4	DP V19C (1A200V 200NS)
UP-7720G	D809	0940475	1	DB S24LCA20
UP-7720G	D810	1090187	1	ZD2 HZ9LC1
UP-7720G	D811	0910597	1	DP V19C (1A200V 200NS)
UP-7720G	D812-D813	0800617	2	DP 1SS81
UP-7720G	D814-D825	0910597	12	DP V19C (1A200V 200NS)
UP-7720G	D826	0800617	1	DP 1SS81
UP-7720G	D827-D829	0800626	3	D U19C
UP-7720G	D830	0800617	1	DP 1SS81
UP-7720G	D831	0910659	1	DP V19G (1.0A 600V)
UP-7720G	D832-D835	0800617	4	DP 1SS81
UP-7720G	D836	1090258	1	ZD2 HZ6LB1
UP-7720G	D837	0800617	1	DP 1SS81
UP-7720G	D838	1090258	1	ZD2 HZ6LB1
UP-7720G	FH801-FH802	5625396	2	FH FEU 031.1681
UP-7720G	F803-F806	5620846	4	FUSE MC-3 (3A125V)
UP-7720G	F807-F808	5620659	2	FUSE F-1065 15A
UP-7720G	IC801-IC802	1601893	2	MD SWC-01
UP-7720G	IC803	1302315	1	MIC HD14011BP(MC14011BCP)
UP-7720G	IC804	1302298	1	MIC HD14001BP(MC14001BCP)
UP-7720G	IC805	1250219	1	REG HA17723 (723CJ.G)
UP-7720G	IC806	1251316	1	OPIC uPC271C
UP-7720G	IC807	1253706	1	REG HA17806P Regulator
UP-7720G	IC808	1252449	1	REG MC7906CT
UP-7720G	IC809	1253822	1	REG HA178M12
UP-7720G	IC810	1252262	1	AIC uPC393C (LM393N)
UP-7720G	L801-L802	3751183	2	CH SKP-5-80
UP-7720G	L803	3750986	1	CH LH3-332K (3.3mH)
UP-7720G	L804	3751192	1	CH SKL-204
UP-7720G	L805-L807	3751165	3	CH LH3 102K 1000uH

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7720G	L808	3751174	1	CH LH3 222K 2200uH
UP-7720G	L809-L810	3799505	2	L LH5-102K 1mH
UP-7720G	L811	3788829	1	L BL02RN2-R62
UP-7720G	L812-L813	3788811	2	L 2643-000301
UP-7720G	L814-L815	3788829	2	L BL02RN2-R62
UP-7720G	Q801	0400648	1	TRD 2SD799
UP-7720G	Q802-Q803	0302504	2	TRC 2SC4237
UP-7720G	Q804-Q805	0101445	2	TRA 2SA1020
UP-7720G	Q806	0302433	1	TRC 2SC2324K
UP-7720G	Q807-Q808	0101454	2	TRA 2SA1293
UP-7720G	Q809	0101151	1	TRA 2SA1194K HFE;1000
UP-7720G	Q810	0301853	1	TRC 2SC1815
UP-7720G	Q811	0302219	1	TRC 2SC2562 O or Y
UP-7720G	Q812	0101196	1	TRA 2SA1015
UP-7720G	Q813	0950598	1	SCR SF0R1B42 (0.1A100V)
UP-7720G	Q814	0101196	1	TRA 2SA1015
UP-7720G	RY801-RY802	3400277	2	RY MC12D1-0
UP-7720G	R805	4093525	1	RM RGD5-2 470ohm
UP-7720G	SW801	3250367	1	SW JPZ2120-0101
UP-7720G	TH801-TH802	1705932	2	TH 5D-11
UP-7720G	TH803	1705941	1	TH 2KD-5 25 C 2K
UP-7720G	T801	3772347	1	T PT36271A
UP-7720G	T802	3772302	1	PLTF PT7332
UP-7720G	T803-T804	3772311	2	PLTF PT7333
UP-7720G	VR801	4160604	1	TPOT GF06P 5KOHM
UP-7720G	VR802	4160792	1	TPOT GF06P 200 OHM
UP-7720G	VR803	4160596	1	TPOT GF06P 1KOHM
UP-7720G	VR804	4160792	1	TPOT GF06P 200 OHM
UP-7720G	VR805-VR806	4160613	2	TPOT GF06P 10KOHM
UP-7720G	VR807	4160827	1	TPOT GF06P 500KOHM

UP-7737 ECG/CPU BD

UP-7737	CNJ100	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-7737	CNJ105	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7737	CNJ106	5427173	1	PCN HIF3F-40PADSA 40P
UP-7737	CNJ108	5425139	1	PCN HKP-22MS-11BT
UP-7737	CNJ110	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-7737	CNJ116	5427663	1	PCN M60-12-30-114P STRAIGHT

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7737	CNJ157	5427743	1	PCN HIF3F-34PA-2.54DSA
UP-7737	CNJ303	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7737	CNJ355	5427636	1	PCN M60-03-30-114P STRAIGHT
UP-7737	C100-C101	3820768	2	FLC1 454M6302 104K
UP-7737	C103-C109	3820768	7	FLC1 454M6302 104K
UP-7737	C111-C113	3820768	3	FLC1 454M6302 104K
UP-7737	C120	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7737	C121	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7737	C122	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7737	C123	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7737	C124	3839561	1	FLC1 ECQ-B1H222JZ 0.0022uF
UP-7737	C125-C126	3839793	2	FLC1 ECQ-V1H224JZ 0.22uF
UP-7737	C127	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7737	C128	3839686	1	FLC1 ECQ-B1H223JZ 0.022uF
UP-7737	C129	3851137	1	CEC2 DD05B331K500 500V330pF
UP-7737	C130	3851119	1	CEC2 DD05B151K500 500V150pF
UP-7737	C201-C206	3820768	6	FLC1 454M6302 104K
UP-7737	C207-C210	3839641	4	FLC1 ECQ-B1H103JZ 0.01uF
UP-7737	C211-C218	3820768	8	FLC1 454M6302 104K
UP-7737	C220-C221	3820768	2	FLC1 454M6302 104K
UP-7737	C230-C231	3839525	2	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C232	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7737	C233	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C234	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7737	C241-C242	3839525	2	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C243	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7737	C250-C251	3839873	2	FLC1 ECQ-V1H105JZ 1.0uF
UP-7737	C252	3839721	1	FLC1 ECQ-V1H473JZ 0.047uF
UP-7737	C253	3851155	1	CEC2 DD06B681K500 500V680pF
UP-7737	C254	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7737	C255	3820768	1	FLC1 454M6302 104K
UP-7737	C256	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7737	C257-C270	3820768	14	FLC1 454M6302 104K
UP-7737	C271-C272	3800219	2	EC04 ECEA1CS470 16V47uF
UP-7737	C273	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7737	C274	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-7737	C275	3839721	1	FLC1 ECQ-V1H473JZ 0.047uF
UP-7737	C280	3820768	1	FLC1 454M6302 104K
UP-7737	C301-C304	3839525	4	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C305	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-7737	C306	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7737	C307	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7737	C309-C310	3800371	2	EC04 ECEA1VS100 35V10uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7737	C311	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C312	3839739	1	FLC1 ECQ-V1H683JZ 0.068uF
UP-7737	C313-C314	3839819	2	FLC1 ECQ-V1H334JZ 0.33uF
UP-7737	C315-C316	3839757	2	FLC1 ECQ-V1H104JZ 0.1uF
UP-7737	C351-C352	3839641	2	FLC1 ECQ-B1H103JZ 0.01uF
UP-7737	C353	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-7737	C354	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7737	C355-C356	3800371	2	EC04 ECEA1VS100 35V10uF
UP-7737	C401	3851119	1	CEC2 DD05B151K500 500V150pF
UP-7737	C402-C407	3820768	6	FLC1 454M6302 104K
UP-7737	DA101	0950571	1	D MA430
UP-7737	DA102	0950544	1	D MA423 Cathode common
UP-7737	DA103	0950553	1	D MA424 Anode common
UP-7737	DA104	0950544	1	D MA423 Cathode common
UP-7737	DA105	0950553	1	D MA424 Anode common
UP-7737	DA201	0950544	1	D MA423 Cathode common
UP-7737	DA202	0950553	1	D MA424 Anode common
UP-7737	DA231	0950553	1	D MA424 Anode common
UP-7737	DA232	0950544	1	D MA423 Cathode common
UP-7737	DA233	0950553	1	D MA424 Anode common
UP-7737	D100-D103	4322528	4	D 1S2076ARE
UP-7737	D106-D108	4322528	3	D 1S2076ARE
UP-7737	D201-D216	0800564	16	D 1SS237
UP-7737	D217-D218	4322528	2	D 1S2076ARE
UP-7737	D219	0800564	1	D 1SS237
UP-7737	D220-D231	4322528	12	D 1S2076ARE
UP-7737	D232	0800092	1	D 0A91(1S1005)
UP-7737	D241-D242	4322528	2	D 1S2076ARE
UP-7737	D253-D257	4322528	5	D 1S2076ARE
UP-7737	D258-D259	0800644	2	D 1SV126
UP-7737	D260-D261	4322528	2	D 1S2076ARE
UP-7737	D301-D302	4322528	2	D 1S2076ARE
UP-7737	D303-D304	1000258	2	ZD2 HZ9C1 500mW 9.2mA
UP-7737	D305-D314	0800644	10	D 1SV126
UP-7737	D351-D354	4322528	4	D 1S2076ARE
UP-7737	D355-D356	1000258	2	ZD2 HZ9C1 500mW 9.2mA
UP-7737	D357-D358	4322528	2	D 1S2076ARE
UP-7737	D401	4322528	1	D 1S2076ARE
UP-7737	GA351	2100335	1	GA B1C90 (90V)
UP-7737	ICS103	5422846	1	SOKT IC SOCKET DL-2-28A (01)
UP-7737	ICS107	5601279	1	SOKT 208-93-764 64PIC SOCKET
UP-7737	ICS201	5601279	1	SOKT 208-93-764 64PIC SOCKET
UP-7737	ICS203	5422846	1	SOKT IC SOCKET DL-2-28A (01)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7737	ICS405	5601279	1	SOKT 208-93-764 64PIC SOCKET
UP-7737	ICS413	5422846	1	SOKT IC SOCKET DL-2-28A (01)
UP-7737	IC101	1205786	1	CPU uPD71055C(82C55A-2)
UP-7737	IC102	1302859	1	CPU uPD8279C-2
UP-7737	IC104	1207222	1	CPU DC-HOST (GAL 16V8-25LP)
UP-7737	IC105	1253403	1	AIC TL7700C
UP-7737	IC106	1303528	1	MIC uPD74HC123C(HD74HC123P)
UP-7737	IC107	1207721	1	CPU HD63C03Y (3MHZ)
UP-7737	IC108	1303074	1	MIC uPD74HC4040C(HD74HC4040P
UP-7737	IC109	1302948	1	MIC uPD74HC08C(HD74HC08P)
UP-7737	IC110	1302975	1	MIC HD74HC32P(uPD74HC32C)
UP-7737	IC112	1203752	1	TIC SN74LS365
UP-7737	IC114	1252752	1	OPIC HA17082PS 2FET
UP-7737	IC115	1302948	1	MIC uPD74HC08C(HD74HC08P)
UP-7737	IC116	1302912	1	MIC HD74HC00P(uPD74HC00C)
UP-7737	IC120	1206473	1	CPU MB84256-10LP-G
UP-7737	IC121	1302912	1	MIC HD74HC00P(uPD74HC00C)
UP-7737	IC201	1207721	1	CPU HD63C03Y (3MHZ)
UP-7737	IC202	1253501	1	ADIC uPD-7004C8CH10BITA/D
UP-7737	IC204	1206473	1	CPU MB84256-10LP-G
UP-7737	IC205	1303065	1	MIC HD74HC245P(uPD74HC245C)
UP-7737	IC206-IC207	1303056	2	MIC HD74HC244P(uPD74HC244C)
UP-7737	IC208	1302993	1	MIC HD74HC139P(uPD74HC139C)
UP-7737	IC209	1302939	1	MIC HD74HC04P(uPD74HC04C)
UP-7737	IC210	1302912	1	MIC HD74HC00P(uPD74HC00C)
UP-7737	IC211	1302975	1	MIC HD74HC32P(uPD74HC32C)
UP-7737	IC212	1303243	1	MIC HD74HC374P(uPD74HC374C)
UP-7737	IC230	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7737	IC250	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7737	IC251	1601875	1	MD NP2014B
UP-7737	IC252	1300611	1	MIC HD14051BP(MC14051BCP)
UP-7737	IC253	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7737	IC254-IC255	1253118	2	OPIC uPC324C QUAD
UP-7737	IC256	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-7737	IC257	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7737	IC258	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-7737	IC301-IC302	1252084	2	OPIC TL072CP
UP-7737	IC303-IC305	1300611	3	MIC HD14051BP(MC14051BCP)
UP-7737	IC306	1253724	1	OPIC uPC4570C
UP-7737	IC307	1251165	1	OPIC uPC1458C
UP-7737	IC308	1251904	1	AIC MB4204 (uPC339C)
UP-7737	IC309	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7737	IC310	1251601	1	REG uPC78L05J (NJM78L05A)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7737	IC311	1252494	1	REG uPC79L05J (NJM79L05A)
UP-7737	IC351	1252084	1	OPIC TL072CP
UP-7737	IC352	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7737	IC401-IC402	1303056	2	MIC HD74HC244P(uPD74HC244C)
UP-7737	IC403	1303065	1	MIC HD74HC245P(uPD74HC245C)
UP-7737	IC404	1206473	1	CPU MB84256-10LP-G
UP-7737	IC405	1205768	1	CPU HD63B03XP
UP-7737	IC406	1251174	1	ADIC uPC624C (DAC-08CQ)
UP-7737	IC408	1300522	1	MIC HD14042BP (MC14042BCP)
UP-7737	IC409	1303546	1	MIC HD74HC151P (uPD74HC151C)
UP-7737	IC410	1303074	1	MIC uPD74HC4040C(HD74HC4040P
UP-7737	IC411	1302921	1	MIC uPD74HC02C(HD74HC02P)
UP-7737	IC412	1303412	1	MIC SN74HC03N(uPD74HC03C)
UP-7737	PC301	0600254	1	TRP PC837
UP-7737	PC302	1704345	1	TRP PC817 PHOTOCOUPLER
UP-7737	Q230-Q231	0300613	2	TRC 2SC1213AK-D(2SC1781H-B-C)
UP-7737	Q240-Q241	0300613	2	TRC 2SC1213AK-D(2SC1781H-B-C)
UP-7737	Q250	0100107	1	TRA 2SA495G-Y Yellow
UP-7737	Q251	0300613	1	TRC 2SC1213AK-D(2SC1781H-B-C)
UP-7737	Q252	0101124	1	TRA 2SA836 C or D
UP-7737	RA100	4090582	1	RM EXB-P84-103J
UP-7737	RA101	4090813	1	RM EXB-P88-103J
UP-7737	RA102	4090582	1	RM EXB-P84-103J
UP-7737	RA104	4090813	1	RM EXB-P88-103J
UP-7737	RA105-RA106	4091153	2	RM EXB-T44-101J
UP-7737	RA201-RA202	4092624	2	RM EXB-T44-472J 4.7 KOHM
UP-7737	RA203	4090822	1	RM EXB-P88-472J
UP-7737	RA204	4090787	1	RM EXB-P88-104J
UP-7737	RA206	4090813	1	RM EXB-P88-103J
UP-7737	RA230	4091884	1	RM EXB-P84-472J
UP-7737	RA301	4093338	1	RM CMR-042B 20.0K OHM
UP-7737	RA302	4093347	1	RM CMR-042A 30.1K OHM
UP-7737	RA303	4090689	1	RM EXB-P84-473J
UP-7737	RA304	4093356	1	RM EXB-F8V-154J
UP-7737	RA305-RA306	4091572	2	RM EXB-T44-103J
UP-7737	RA401	4092517	1	RM EXB-P88-332J 3.3 KOHMX8
UP-7737	SW102	3350838	1	DSW DSS102
UP-7737	T301	3772285	1	PLTF EP17 50KHZ SIG Yellow
UP-7737	T302	3772409	1	PLTF EP17 5V TO 7V Red
UP-7737	T351	3772258	1	PLTF EP13 50KHZ SIG Yellow
UP-7737	T352	3772276	1	PLTF EP13 50KHZ DC-DC Red
UP-7737	VR101	4160685	1	TPOT GF06P 100KOHM
UP-7737	VR251	4160596	1	TPOT GF06P 1KOHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7737	VR252	4160667	1	TPOT GF06P 20KOHM
UP-7737	VR253	4160827	1	TPOT GF06P 500KOHM
UP-7737	VR254	4160667	1	TPOT GF06P 20KOHM
UP-7737	VR255	4160604	1	TPOT GF06P 5KOHM
UP-7737	X100	1750927	1	XTAL TD308C(XCO-B)8MHZ
UP-7737	X200	1706004	1	XTAL TD 308C XCO-B 12MHZ
UP-7737	ZD250	1253519	1	REG LT1009CZ 2.5VREF
UP-7737	ZD251	1090329	1	ZD2 HZ6C1 6V
UP-7737	ZD252	1000534	1	ZD1 HZ3B-2 500mW 3.0V
UP-7737	CNJ101	5445474	1	PCN IL-2P-S3FP2-1
UP-7737	C151	3851066	1	CEC2 DD05SL220K500 500V22pF
UP-7737	C152	3890353	1	ECR-GA035M11-35pF
UP-7737	C153	3839837	1	FLC1 ECQ-V1H474JZ 0.47uF
UP-7737	C381-C382	3839793	2	FLC1 ECQ-V1H224JZ 0.22uF
UP-7737	C383	3810832	1	TC04 204M3502 105M4 (1uF/35V)
UP-7737	C384	3839721	1	FLC1 ECQ-V1H473JZ 0.047uF
UP-7737	C385	3839703	1	FLC1 ECQ-V1H333JZ 0.033uF
UP-7737	C386-C387	3820768	2	FLC1 454M6302 104K
UP-7737	D151-D153	4322528	3	D 1S2076ARE
UP-7737	D381-D382	4322528	2	D 1S2076ARE
UP-7737	IC151	1303662	1	CPU MSM6242 RS
UP-7737	IC380	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7737	IC381	1252752	1	OPIC HA17082PS 2FET
UP-7737	T381	3772258	1	PLTF EP13 50KHZ SIG Yellow
UP-7737	VR381	4160827	1	TPOT GF06P 500KOHM
UP-7737	X151	1702597	1	XTAL KF38G 32.768KHZ

UP-7738 MOTOR CONTROL BD

UP-7738	CNJ700	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7738	CNJ706	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-7738	CNJ710	5423195	1	PCN HKP-20MS-10BT
UP-7738	CNJ716	5427636	1	PCN M60-03-30-114P STRAIGHT
UP-7738	C700-C701	3800371	2	EC04 ECEA1VS100 35V10uF
UP-7738	C702	3839721	1	FLC1 ECQ-V1H473JZ 0.047uF
UP-7738	C703	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7738	C704	3820001	1	FLC1 MFL5002-102K 50V0.001uF
UP-7738	C705	3801405	1	EC04 ECES1CV153S
UP-7738	C706	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7738	C707	3800201	1	EC04 ECEA1CS220 16V22uF
UP-7738	C708	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7738	C711	3810502	1	TC04 ECSZ35HS6R8(242M3502-685M
UP-7738	C712	3800389	1	EC04 ECEA1VS220 35V22uF
UP-7738	C713	3800219	1	EC04 ECEA1CS470 16V47uF
UP-7738	C714-C715	3839757	2	FLC1 ECQ-V1H104JZ 0.1uF
UP-7738	C716	3810877	1	TC04 204M3502 475M4(4.7uF/35V)
UP-7738	C717	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-7738	D700	1000383	1	ZD1 HZ3C3 500mW 3.3V
UP-7738	D704-D705	0800172	2	D 1S2076A(1S953(3)1S954)
UP-7738	IC700	1252262	1	AIC uPC393C (LM393N)
UP-7738	IC701	1251512	1	REG HA178M05
UP-7738	IC702	1300567	1	MIC HD14046BP(MC14046BCP)
UP-7738	IC703	1251601	1	REG uPC78L05J (NJM78L05A)
UP-7738	IC704	1250148	1	OPIC HA17741 PS(GS)(741T,C151)
UP-7738	IC705	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7738	L701	3788063	1	L LF1-101K 100uH
UP-7738	Q700-Q703	0300596	4	TRC 2SC1345K-D(2SC1707H-C)
UP-7738	Q704	0100107	1	TRA 2SA495G-Y Yellow
UP-7738	Q705	0400488	1	TRD 2SD768K with SK16B YC40B
UP-7738	Q706	0100107	1	TRA 2SA495G-Y Yellow
UP-7738	SW700	3350838	1	DSW DSS102
UP-7738	VR700	4160925	1	TPOT GF-06S(ET-6S) 20KOHM
UP-7738	VR701	4160952	1	TPOT GF-06S(ET-6S) 2KOHM
UP-7738	VR702	4160925	1	TPOT GF-06S(ET-6S) 20KOHM
UP-7738	VR703	4160997	1	TPOT GF-06S(ET-6S)100KOHM

UP-7740 CRT DRIVER

UP-7740	AR601-AR602	1704559	2	TH T08-230B Arrestor
UP-7740	CNJ600	5422338	1	PCN HKP-10M5S-9T
UP-7740	CNJ607	5427716	1	PCN M60-12-30-134
UP-7740	CNJ610	5420982	1	ACN2 A3-705B-00P 3P MALE 3Q
UP-7740	CNJ617	5427681	1	PCN M60-03-30-134
UP-7740	CNJ620	5427654	1	PCN M60-09-30-114P STRAIGHT
UP-7740	CNJ630	5427725	1	PCN M60-15-30-134
UP-7740	C601	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7740	C603	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7740	C604	3839561	1	FLC1 ECQ-B1H222JZ 0.0022uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7740	C605	3851128	1	CEC2 DD05B221K500 500V220pF
UP-7740	C610	3839837	1	FLC1 ECQ-V1H474JZ 0.47uF
UP-7740	C611-C612	3810502	2	TC04 ECSZ35HS6R8(242M3502-685M
UP-7740	C613-C614	3800219	2	EC04 ECEA1CS470 16V47uF
UP-7740	C615-C616	3820028	2	FLC1 MFL5002-222K 50V0.0022uF
UP-7740	C618-C619	3800219	2	EC04 ECEA1CS470 16V47uF
UP-7740	C620-C625	3820768	6	FLC1 454M6302 104K
UP-7740	C626-C627	3800406	2	EC04 ECEA1HS470 50V47uF
UP-7740	C630-C631	3800228	2	EC04 ECEA1CS101 16V100uF
UP-7740	C632	3800371	1	EC04 ECEA1VS100 35V10uF
UP-7740	C633-C634	3810502	2	TC04 ECSZ35HS6R8(242M3502-685M
UP-7740	C651	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7740	DA601	0950544	1	D MA423 Cathode common
UP-7740	DA602	0950553	1	D MA424 Anode common
UP-7740	DA604	0950571	1	D MA430
UP-7740	D602-D603	0800172	2	D 1S2076A(1S953(3)1S954)
UP-7740	D604	1000383	1	ZD1 HZ3C3 500mW 3.3V
UP-7740	D607	1000383	1	ZD1 HZ3C3 500mW 3.3V
UP-7740	D616-D622	0800172	7	D 1S2076A(1S953(3)1S954)
UP-7740	IC601	1252752	1	OPIC HA17082PS 2FET
UP-7740	IC602	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7740	IC603	1252752	1	OPIC HA17082PS 2FET
UP-7740	IC604	1253698	1	OPIC uPC 811C (LF 411CN)
UP-7740	IC605	1300629	1	MIC HD14052BP(MC14052BCP)
UP-7740	IC606	1253698	1	OPIC uPC 811C (LF 411CN)
UP-7740	IC607	1252752	1	OPIC HA17082PS 2FET
UP-7740	IC608	1301601	1	MIC HD14538BP (MC14538BCP)
UP-7740	L601	3751129	1	CH LH5-562
UP-7740	L602-L605	3780044	4	L LF5-471K
UP-7740	Q601	0301416	1	TRC 2SC372G-Y
UP-7740	Q603	0400488	1	TRD 2SD768K with SK16B YC40B
UP-7740	Q604	0200463	1	TRB 2SB727K with SK16B,YC40B
UP-7740	Q605	0400488	1	TRD 2SD768K with SK16B YC40B
UP-7740	Q606	0200463	1	TRB 2SB727K with SK16B,YC40B
UP-7740	Q607	0400488	1	TRD 2SD768K with SK16B YC40B
UP-7740	Q608	0200463	1	TRB 2SB727K with SK16B,YC40B
UP-7740	Q610	0100241	1	TRA 2SA673AK-C(2SA876H-B-C)
UP-7740	RA601	4090831	1	RM EXB-T44-102J
UP-7740	VR601	4160809	1	TPOT GF06P 2KOHM
UP-7740	VR602-VR606	4160667	5	TPOT GF06P 20KOHM
UP-7740	VR608	4160827	1	TPOT GF06P 500KOHM
UP-7740	VR609	4160854	1	TPOT RJ-6P 5MOHM
UP-7746	CNJ611	5427716	1	PCN M60-12-30-134

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7746 I/O CONNECTOR BD				
UP-7746	CNJ640	5427716	1	PCN M60-12-30-134
UP-7746	CNP116	5427476	1	PCN M62-12-3039SA-1 (20)
UP-7850 RELAY BD				
UP-7850	CNJ585	5424256	1	NCN 2-171825-4 Receptacle Male
UP-7850	CNP575	5416309	1	NCN 5195-2 HOUSING
UP-7850	CNP575	5416318	2	NCN 5194TL TERMINAL
UP-7850	CNP585	5415551	8	NCN Pin 170204-2
UP-7850	CNP585	5424265	2	NCN 2-171822-4 PLUG FEMALE
UP-7850	RLY502-RLY503	3400384	2	RY HV Relay NKR-102G 8KV 80mA
UP-7851 HIGH VOLTAGE BD				
UP-7851		5491361	1	CHEM HEAT SINK SHEET TO-3P2 TC30AG(F-1)
UP-7851	CNJ501	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-7851	CNJ511	5414864	1	NCN 350543-1 4P
UP-7851	CNJ515	5424024	1	NCN 171825-2 Receptacle Male
UP-7851	CNJ525	5424033	1	NCN 171825-3 Receptacle Male
UP-7851	CNJ535	5427734	1	PCN 170267-1
UP-7851	CNJ545	5427734	1	PCN 170267-1
UP-7851	CNJ555	5427681	1	PCN M60-03-30-134
UP-7851	CNJ565	5424256	1	NCN 2-171825-4 Receptacle Male
UP-7851	CNJ575	5416327	1	NCN 5273-2A
UP-7851	C500	3851146	1	CEC2 DD05B471K500 500V470pF
UP-7851	C501	3800469	1	EC04 ECEA1HS010 50V1uF
UP-7851	C502	3839605	1	FLC1 ECQ-B1H472JZ 0.0047uF
UP-7851	C503	3801245	1	EC04 ECEA1VU 102
UP-7851	C504	3800193	1	EC04 ECEA1CS100 16V10uF
UP-7851	C505	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7851	C506	3800237	1	EC04 ECEA1CS221 16V220uF
UP-7851	C507	3801414	1	EC04 ECES1EU682G 25V6800uF
UP-7851	C509	3800469	1	EC04 ECEA1HS010 50V1uF

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-7851	C510	3839757	1	FLC1 ECQ-V1H104JZ 0.1uF
UP-7851	C514	3859147	1	CEC2 10MDQ222M
UP-7851	C515	3839605	1	FLC1 ECQ-B1H472JZ 0.0047uF
UP-7851	C516	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-7851	C517-C520	3839757	4	FLC1 ECQ-V1H104JZ 0.1uF
UP-7851	C721	3839641	1	FLC1 ECQ-B1H103JZ 0.01uF
UP-7851	C722-C723	3810502	2	TC04 ECSZ35HS6R8(242M3502-685M
UP-7851	C724	3839703	1	FLC1 ECQ-V1H333JZ 0.033uF
UP-7851	C725	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-7851	D500-D502	4322528	3	D 1S2076ARE
UP-7851	D503-D504	0910008	2	DP SR1FM8 800mA 400V
UP-7851	D506-D509	4322528	4	D 1S2076ARE
UP-7851	D510-D513	1101006	4	DP RC2 2007A 2KV
UP-7851	D515	0910008	1	DP SR1FM8 800mA 400V
UP-7851	D517	0910008	1	DP SR1FM8 800mA 400V
UP-7851	D518-D522	4322528	5	D 1S2076ARE
UP-7851	D720-D721	4322528	2	D 1S2076ARE
UP-7851	IC501	1253047	1	REG TL494CN SW REG
UP-7851	IC502	1300112	1	MIC MC14001UBCP (CD4001UBE)
UP-7851	IC503	1300638	1	MIC HD14053BP(MC14053BCP)
UP-7851	IC504	1253109	1	OPIC uPC358C DUAL
UP-7851	IC505	1253706	1	REG HA17806P Regulator
UP-7851	IC506	1252449	1	REG MC7906CT
UP-7851	IC720	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-7851	L501-L502	3788009	2	L LF1-101K
UP-7851	Q500	0400568	1	TRD 2SD1271
UP-7851	Q501	0200499	1	TRB 2SB946
UP-7851	Q502	0400621	1	TRD 2SD1038
UP-7851	Q503	0400434	1	TRD 2SD571 L or M
UP-7851	Q504-Q506	0300596	3	TRC 2SC1345K-D(2SC1707H-C)
UP-7851	Q507	0200499	1	TRB 2SB946
UP-7851	RLY501	3430707	1	RY HV Relay NKR-102 8KV 80mA
UP-7851	T500	3790167	1	FBTF T-3790167 HV-DD
UP-7851	VR500	4160667	1	TPOT GF06P 20KOHM
UP-7851	VR501	4160658	1	TPOT GF06P 500 OHM
UP-7851	VR720	4160685	1	TPOT GF06P 100KOHM
UP-7851	VR721	4160613	1	TPOT GF06P 10KOHM

UP-76351 ECG/CPU BD

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-76351	CNJ100	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-76351	CNJ101	5445474	1	PCN IL-2P-S3FP2-1
UP-76351	CNJ105	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-76351	CNJ106	5427173	1	PCN HIF3F-40PADSA 40P
UP-76351	CNJ108	5425139	1	PCN HKP-22MS-11BT
UP-76351	CNJ110	5427663	1	PCN M60-12-30-114P STRAIGHT
UP-76351	CNJ157	5427743	1	PCN HIF3F-34PA-2.54DSA
UP-76351	CNJ303	5427672	1	PCN M60-15-30-114P STRAIGHT
UP-76351	CNJ355	5427636	1	PCN M60-03-30-114P STRAIGHT
UP-76351	C100	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-76351	C103-C109	4317525	7	CEC1 TP D55Y5V1H 104Z 5-W
UP-76351	C111	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-76351	C112	3820768	1	FLC1 454M6302 104K
UP-76351	C113	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-76351	C120	3800469	1	EC04 ECEA1HS010 50V1uF
UP-76351	C121	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-76351	C122	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-76351	C123	3800469	1	EC04 ECEA1HS010 50V1uF
UP-76351	C124	4315082	1	FLC1 ECQ-B 1H 222JZ3 0.0022uF
UP-76351	C125-C126	3839793	2	FLC1 ECQ-V1H224JZ 0.22uF
UP-76351	C127	3800469	1	EC04 ECEA1HS010 50V1uF
UP-76351	C128	4315206	1	FLC1 ECQ-B 1H 223JZ3 0.022uF
UP-76351	C129	4317623	1	CEC2 DD05-989B 331K500 (330pF)
UP-76351	C130	4317614	1	CEC2 DD05-989B 221K500 (220pF)
UP-76351	C151	3851066	1	CEC2 DD05SL220K500 500V22pF
UP-76351	C152	3890353	1	ECR-GA035M11-35pF
UP-76351	C153	3839837	1	FLC1 ECQ-V1H474JZ 0.47uF
UP-76351	C201-C206	4315304	6	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-76351	C207-C210	4315162	4	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-76351	C211-C220	4315304	10	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-76351	C230	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C231	3839525	1	FLC1 ECQ-B1H102JZ 0.001uF
UP-76351	C232	3800371	1	EC04 ECEA1VS100 35V10uF
UP-76351	C233	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C234	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-76351	C241-C242	4315046	2	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C243	3800371	1	EC04 ECEA1VS100 35V10uF
UP-76351	C250-C251	3839873	2	FLC1 ECQ-V1H105JZ 1.0uF
UP-76351	C252	4315269	1	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-76351	C253	4317641	1	CEC2 DD06-999B 681K500 (680pF)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-76351	C254	3824461	1	MPC ECQ-V1H 154JZ 50V 0.15uF
UP-76351	C255	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-76351	C256	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-76351	C257-C270	4315304	14	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-76351	C271-C272	3800219	2	EC04 ECEA1CS470 16V47uF
UP-76351	C273	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-76351	C274	3839793	1	FLC1 ECQ-V1H224JZ 0.22uF
UP-76351	C275	4315269	1	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-76351	C301-C304	4315046	4	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C305	3839819	1	FLC1 ECQ-V1H334JZ 0.33uF
UP-76351	C306	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-76351	C307	3800371	1	EC04 ECEA1VS100 35V10uF
UP-76351	C309-C310	3800371	2	EC04 ECEA1VS100 35V10uF
UP-76351	C311	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C312	4315287	1	FLC1 ECQ-V 1H 683JZ3 (0.068uF)
UP-76351	C351-C352	4315162	2	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-76351	C353	3839873	1	FLC1 ECQ-V1H105JZ 1.0uF
UP-76351	C354	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-76351	C355-C356	3800371	2	EC04 ECEA1VS100 35V10uF
UP-76351	C401	4317614	1	CEC2 DD05-989B 221K500 (220pF)
UP-76351	C402-C407	4317525	6	CEC1 TP D55Y5V1H 104Z 5-W
UP-76351	DA101	0950571	1	D MA430
UP-76351	DA102	0800582	1	D Diode Array DAN 401
UP-76351	DA103	0800573	1	D Diode Array DAP 401
UP-76351	DA104	0800582	1	D Diode Array DAN 401
UP-76351	DA105	0800573	1	D Diode Array DAP 401
UP-76351	DA231	0800573	1	D Diode Array DAP 401
UP-76351	DA232	0800582	1	D Diode Array DAN 401
UP-76351	DA233	0800573	1	D Diode Array DAP 401
UP-76351	D100-D106	4322528	7	D 1S2076ARE
UP-76351	D151-D153	4322528	3	D 1S2076ARE
UP-76351	D201-D216	0800564	16	D 1SS237
UP-76351	D217-D218	4322528	2	D 1S2076ARE
UP-76351	D219	0800564	1	D 1SS237
UP-76351	D220-D225	4322528	6	D 1S2076ARE
UP-76351	D230-D231	4322528	2	D 1S2076ARE
UP-76351	D232	0800092	1	D 0A91(1S1005)
UP-76351	D241-D242	4322528	2	D 1S2076ARE
UP-76351	D253-D259	4322528	7	D 1S2076ARE
UP-76351	D301-D302	4322528	2	D 1S2076ARE
UP-76351	D303-D304	4327612	2	ZD2 HZ9C1RE (8.9-9.3V)
UP-76351	D305-D314	0800644	10	D 1SV126
UP-76351	D351-D354	4322528	4	D 1S2076ARE

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-76351	D355-D356	4327612	2	ZD2 HZ9C1RE (8.9-9.3V)
UP-76351	D357-D358	4322528	2	D 1S2076ARE
UP-76351	D401	4322528	1	D 1S2076ARE
UP-76351	GA351	2100335	1	GA B1C90 (90V)
UP-76351	ICS103	5422846	1	SOKT IC SOCKET DL-2-28A (01)
UP-76351	ICS107	5601279	1	SOKT 208-93-764 64PIC SOCKET
UP-76351	ICS201	5601279	1	SOKT 208-93-764 64PIC SOCKET
UP-76351	ICS203	5422846	1	SOKT IC SOCKET DL-2-28A (01)
UP-76351	ICS405	5601279	1	SOKT 208-93-764 64PIC SOCKET
UP-76351	IC101	1205786	1	CPU uPD71055C(82C55A-2)
UP-76351	IC102	1302859	1	CPU uPD8279C-2
UP-76351	IC104	1302984	1	MIC uPD74HC138C(HD74HC138P)
UP-76351	IC105	1253403	1	AIC TL7700C
UP-76351	IC106	1303528	1	MIC uPD74HC123C(HD74HC123P)
UP-76351	IC107	1205768	1	CPU HD63B03XP
UP-76351	IC108	1303074	1	MIC uPD74HC4040C(HD74HC4040P
UP-76351	IC109	1302948	1	MIC uPD74HC08C(HD74HC08P)
UP-76351	IC110	1302975	1	MIC HD74HC32P(uPD74HC32C)
UP-76351	IC112	1203752	1	TIC SN74LS365
UP-76351	IC114	1252752	1	OPIC HA17082PS 2FET
UP-76351	IC115	1302948	1	MIC uPD74HC08C(HD74HC08P)
UP-76351	IC116	1302912	1	MIC HD74HC00P(uPD74HC00C)
UP-76351	IC151	1303662	1	CPU MSM6242 RS
UP-76351	IC201	1205768	1	CPU HD63B03XP
UP-76351	IC202	1253501	1	ADIC uPD-7004C8CH10BITA/D
UP-76351	IC204	1206473	1	CPU MB84256-10LP-G
UP-76351	IC205	1303065	1	MIC HD74HC245P(uPD74HC245C)
UP-76351	IC206-IC207	1303056	2	MIC HD74HC244P(uPD74HC244C)
UP-76351	IC208	1302912	1	MIC HD74HC00P(uPD74HC00C)
UP-76351	IC209	1302939	1	MIC HD74HC04P(uPD74HC04C)
UP-76351	IC230	1300629	1	MIC HD14052BP(MC14052BCP)
UP-76351	IC250	1300629	1	MIC HD14052BP(MC14052BCP)
UP-76351	IC251	1601875	1	MD NP2014B
UP-76351	IC252	1300611	1	MIC HD14051BP(MC14051BCP)
UP-76351	IC253	1300638	1	MIC HD14053BP(MC14053BCP)
UP-76351	IC254-IC255	1253118	2	OPIC uPC324C QUAD
UP-76351	IC256	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-76351	IC257	1300638	1	MIC HD14053BP(MC14053BCP)
UP-76351	IC258	1252084	1	OPIC TL072CP
UP-76351	IC301-IC302	1252084	2	OPIC TL072CP
UP-76351	IC303-IC305	1300611	3	MIC HD14051BP(MC14051BCP)
UP-76351	IC306	1253724	1	OPIC uPC4570C
UP-76351	IC307	1251165	1	OPIC uPC1458C

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-76351	IC308	1251904	1	AIC	MB4204 (uPC339C)
UP-76351	IC309	1300629	1	MIC	HD14052BP(MC14052BCP)
UP-76351	IC351	1252084	1	OPIC	TL072CP
UP-76351	IC352	1300629	1	MIC	HD14052BP(MC14052BCP)
UP-76351	IC401-IC402	1303056	2	MIC	HD74HC244P(uPD74HC244C)
UP-76351	IC403	1303065	1	MIC	HD74HC245P(uPD74HC245C)
UP-76351	IC404	1204902	1	CPU	HM6264LP-15(uPD4364C-15L
UP-76351	IC406	1251174	1	ADIC	uPC624C (DAC-08CQ)
UP-76351	IC408	1300522	1	MIC	HD14042BP (MC14042BCP)
UP-76351	IC409	1303546	1	MIC	HD74HC151P (uPD74HC151C)
UP-76351	IC410	1303074	1	MIC	uPD74HC4040C(HD74HC4040P
UP-76351	IC411	1302921	1	MIC	uPD74HC02C(HD74HC02P)
UP-76351	IC412	1303412	1	MIC	SN74HC03N(uPD74HC03C)
UP-76351	PC301	0600254	1	TRP	PC837
UP-76351	PC302	1704345	1	TRP	PC817 PHOTOCOUPLER
UP-76351	Q230-Q231	4335069	2	TRC	2SC1213AKDTZ
UP-76351	Q240-Q241	4335069	2	TRC	2SC1213AKDTZ
UP-76351	Q250	4330038	1	TRA	2SA495GTM-Y,TPE2
UP-76351	Q251	4335069	1	TRC	2SC1213AKDTZ
UP-76351	RA100	4090582	1	RM	EXB-P84-103J
UP-76351	RA101	4090813	1	RM	EXB-P88-103J
UP-76351	RA102-RA103	4090582	2	RM	EXB-P84-103J
UP-76351	RA104	4090813	1	RM	EXB-P88-103J
UP-76351	RA105-RA106	4091153	2	RM	EXB-T44-101J
UP-76351	RA201-RA202	4092624	2	RM	EXB-T44-472J 4.7 KOHM
UP-76351	RA203	4090822	1	RM	EXB-P88-472J
UP-76351	RA204	4090787	1	RM	EXB-P88-104J
UP-76351	RA206	4090813	1	RM	EXB-P88-103J
UP-76351	RA230	4091884	1	RM	EXB-P84-472J
UP-76351	RA301	4093338	1	RM	CMR-042B 20.0K OHM
UP-76351	RA302	4093347	1	RM	CMR-042A 30.1K OHM
UP-76351	RA303	4090689	1	RM	EXB-P84-473J
UP-76351	RA304	4093356	1	RM	EXB-F8V-154J
UP-76351	RA305-RA306	4091572	2	RM	EXB-T44-103J
UP-76351	RA401	4090813	1	RM	EXB-P88-103J
UP-76351	SW100	3352168	1	SW	DSS 104
UP-76351	SW102	3350838	1	DSW	DSS102
UP-76351	T301	3772285	1	PLTF	EP17 50KHZ SIG Yellow
UP-76351	T302	3772267	1	PLTF	EP17 50KHZ DC-DC Red
UP-76351	T351	3772258	1	PLTF	EP13 50KHZ SIG Yellow
UP-76351	T352	3772276	1	PLTF	EP13 50KHZ DC-DC Red
UP-76351	VR101	4160685	1	TPOT	GF06P 100KOHM
UP-76351	VR251	4160596	1	TPOT	GF06P 1KOHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-76351	VR252	4160667	1	TPOT GF06P 20KOHM
UP-76351	VR253	4160827	1	TPOT GF06P 500KOHM
UP-76351	VR254	4160667	1	TPOT GF06P 20KOHM
UP-76351	VR255	4160604	1	TPOT GF06P 5KOHM
UP-76351	X100	1750927	1	XTAL TD308C(XCO-B)8MHZ
UP-76351	X151	1702597	1	XTAL KF38G 32.768KHZ
UP-76351	ZD250	1253519	1	REG LT1009CZ 2.5VREF
UP-76351	ZD251	1090329	1	ZD2 HZ6C1 6V

UP-76391 VR AND CONNECTOR BD

UP-76391		5350531	1	CCN2 HR16-17RA-6S 6P FEMALE
UP-76391	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

UP-76392 VR AND CONNECTOR BD

UP-76392		5395108	1	CCN2 XZ-123R (8S)
UP-76392	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

UP-76393 VR AND CONNECTOR BD

UP-76393		5395108	1	CCN2 XZ-123R (8S)
UP-76393	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

UP-76396 VR AND CONNECTOR BD

UP-76396		5395108	1	CCN2 XZ-123R (8S)
UP-76396	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

UP-76397 VR AND CONNECTOR BD

UP-76397		5395108	1	CCN2 XZ-123R (8S)
UP-76397	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

UP-76398 VR AND CONNECTOR BD

UP-76398		5395108	1	CCN2 XZ-123R (8S)
UP-76398	CNP303	5427966	1	PCN CABLE TEC ECG M62-15

WS-701X RECORDER CHASSIS PARTS

WS-701X		0600236	1	TRP NJL5142EL-A
WS-701X		1800063	1	HEAD EUX-C18A8HC01
WS-701X		3280111	2	SW SS-5GL2
WS-701X		4700593	1	SP EFB-VH36A Piezo speaker
WS-701X		4790673	1	TD MAGNETIC SENSOR FP-2R-02
WS-701X		4810447	1	DCMO EN35-H107N1B (24V)
WS-701X		5424024	1	NCN 171825-2 Receptacle Male
WS-701X	CNP700	5427511	1	PCN M62-15-3034SA (30)
WS-701X	CNP710	5552697	1	PCN HKP20FS02-10BT(15)

WS-702X RECORDER CHASSIS PARTS

WS-702X		0600236	1	TRP NJL5142EL-A
WS-702X		1800063	1	HEAD EUX-C18A8HC01
WS-702X		3280111	2	SW SS-5GL2
WS-702X		4700593	1	SP EFB-VH36A Piezo speaker
WS-702X		4810447	1	DCMO EN35-H107N1B (24V)
WS-702X		5424024	1	NCN 171825-2 Receptacle Male
WS-702X	CNP617	5427306	1	PCN M62-03-3036SA (10)
WS-702X	CNP700	5427511	1	PCN M62-15-3034SA (30)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
WS-702X	CNP710	5552697	1	PCN HKP20FS02-10BT(15)
WS-702X		4740986	1	TD ROTARY ENCODER 200P/R

YZ-000G8 CHASSIS PARTS-2

YZ-000G8		3853331	1	C HV Capacitor IA5040AD
YZ-000G8		4840343	1	FAMO MD516B-12-Q2

YZ-001G0 CHASSIS PARTS-2

YZ-001G0		4840343	1	FAMO MD516B-12-Q2
YZ-001G0	C550	3853429	1	C HV Capacitor NKC5040A

YZ-001G1 CHASSIS PARTS-2

YZ-001G1		3853429	1	C HV Capacitor NKC5040A
YZ-001G1		4840343	1	FAMO MD516B-12-Q2

YZ-001G2 CHASSIS PARTS-2

YZ-001G2	C550	3853429	1	C HV Capacitor NKC5040A

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

YZ-001G3 CHASSIS PARTS-2

YZ-001G3		4840343	1	FAMO MD516B-12-Q2
YZ-001G3	C550	3853429	1	C HV Capacitor NKC5040A

YZ-001G4 CHASSIS PARTS-2

YZ-001G4		3853331	1	C HV Capacitor IA5040AD
YZ-001G4		4840343	1	FAMO MD516B-12-Q2

YZ-001G5 CHASSIS PARTS-2

YZ-001G5		3853429	1	C HV Capacitor NKC5040A
YZ-001G5		4840343	1	FAMO MD516B-12-Q2

YZ-001G6 CHASSIS PARTS-2

YZ-001G6		4840343	1	FAMO MD516B-12-Q2
YZ-001G6	C550	3853429	1	C HV Capacitor NKC5040A

YZ-001G8 CHASSIS PARTS-2

YZ-001G8		4840343	1	FAMO MD516B-12-Q2
YZ-001G8	C550	3853429	1	C HV Capacitor NKC5040A

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

YZ-002G1 CHASSIS PARTS-2

YZ-002G1		3853331	1	C HV Capacitor IA5040AD
YZ-002G1		4840343	1	FAMO MD516B-12-Q2
YZ-002G1		5501084	1	CORD V1.25-4 (250) Black
YZ-002G1	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G1	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G1	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-002G3 CHASSIS PARTS-2

YZ-002G3		4840343	1	FAMO MD516B-12-Q2
YZ-002G3	C550	3853429	1	C HV Capacitor NKC5040A
YZ-002G3		5501084	1	CORD V1.25-4 (250) Black
YZ-002G3	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G3	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G3	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-002G4 CHASSIS PARTS-2

YZ-002G4		5501084	1	CORD V1.25-4 (250) Black
YZ-002G4	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G4	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G4	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-002G5 CHASSIS PARTS-2

YZ-002G5	C550	3853429	1	C HV Capacitor NKC5040A
YZ-002G5		5501084	1	CORD V1.25-4 (250) Black
YZ-002G5	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G5	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G5	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-002G6 CHASSIS PARTS-2				
YZ-002G6		4840343	1	FAMO MD516B-12-Q2
YZ-002G6	C550	3853429	1	C HV Capacitor NKC5040A
YZ-002G6		5501084	1	CORD V1.25-4 (250) Black
YZ-002G6	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G6	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G6	CNP552	5500851	1	CORD HV Cable 201328-1(210) White
YZ-002G7 CHASSIS PARTS-2				
YZ-002G7		3853331	1	C HV Capacitor IA5040AD
YZ-002G7		4840343	1	FAMO MD516B-12-Q2
YZ-002G7		5501084	1	CORD V1.25-4 (250) Black
YZ-002G7	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G7	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G7	CNP552	5500851	1	CORD HV Cable 201328-1(210) White
YZ-002G8 CHASSIS PARTS-2				
YZ-002G8		4840343	1	FAMO MD516B-12-Q2
YZ-002G8	C550	3853429	1	C HV Capacitor NKC5040A
YZ-002G8		5501084	1	CORD V1.25-4 (250) Black
YZ-002G8	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G8	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G8	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

YZ-002G9 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-002G9		3853429	1	C HV Capacitor NKC5040A
YZ-002G9		4840343	1	FAMO MD516B-12-Q2
YZ-002G9		5501084	1	CORD V1.25-4 (250) Black
YZ-002G9	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-002G9	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-002G9	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-003G1 CHASSIS PARTS-2

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-003G1		4840343	1	FAMO MD516B-12-Q2
YZ-003G1	C550	3853429	1	C HV Capacitor NKC5040A
YZ-003G1		5501084	1	CORD V1.25-4 (250) Black
YZ-003G1	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-003G1	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-003G1	CNP552	5500851	1	CORD HV Cable 201328-1(210) White

YZ-003G4 CHASSIS PARTS-2

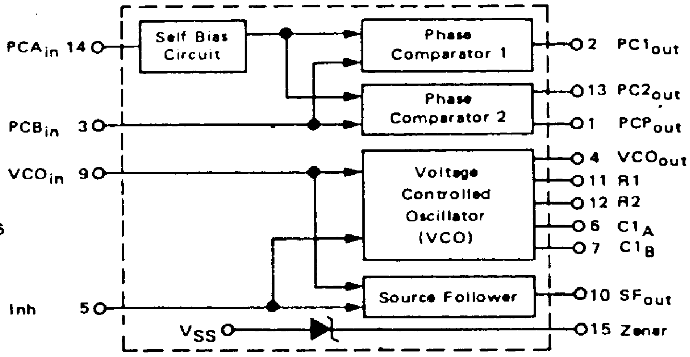
ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
YZ-003G4		3853429	1	C HV Capacitor NKC5040A
YZ-003G4		4840343	1	FAMO MD516B-12-Q2
YZ-003G4		5501084	1	CORD V1.25-4 (250) Black
YZ-003G4	CNP057	5500958	1	CORD 350037-2 with HKP(13)
YZ-003G4	CNP551	5500824	1	CORD HV Cable 201328-1(210) Red
YZ-003G4	CNP552	5500851	1	CORD HV cable 201328-1(210) White

Section 9 IC DATA

CD4046BE 9.1
CD4051BE 9.1
CD4052BE 9.1
CD4053BE 9.1
HA17082PS 9.2
HA17723 .... 9.2
HA17741PS 9.2
HA178M05 .... 9.2
HA17806P 9.2
HA17812P 9.2
HD14042BP 9.2
HD14538BP 9.3
HD63B03XP 9.3
HD637B01X0 .... 9.15
HD74HC00P 9.4
HD74HC04P 9.4
HD74HC151P 9.4
HD74HC244P 9.4
HD74HC245P 9.5
HD74HC32P 9.5
HM6264LP-15 .... 9.5
MB4204 .... 9.6
MC14001BCP 9.6
MC14001UBCP 9.6
MC14011BCP 9.6
MC78L05CP 9.6
MC7906CT 9.6
MSM6242RS 9.6
NJL5142EL-A 9.7
NP2014B 9.7
PC827 .... 9.7
PC817 .... 9.7
PC837 .... 9.7
SN74HC03N 9.7
SN74LS07 .... 9.7
SN74LS365 .... 9.8
SWC-01 .... 9.8
TL072CP 9.9
TL494CN 9.9
TL7700C 9.9
μPA2004C-10 .... 9.9
μPC1458C 9.10
μPC324C 9.10
μPC358C 9.10
μPC393C 9.10
μPC4570C 9.10
μPC624C 9.10
μPC811C 9.11
μPC812C 9.11
μPD7004C 9.11
μPD71055C 9.12
μPD74HC08C 9.12
μPD74HC123C 9.12
μPD74HC138C 9.13
μPD74HC4040 .... 9.13
μPD8279C-2 .... 9.14

CD4046BE

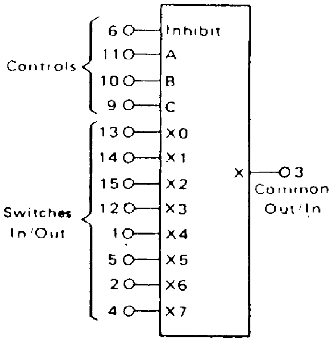
Phase-Locked Loop


PCA$_{in}$ 14
PCB$_{in}$ 3
VCO$_{in}$ 9
Inh 5
Self Bias Circuit
Phase Comparator 1
Phase Comparator 2
Voltage Controlled Oscillator (VCO)
Source Follower
V_{SS}
2 PC1$_{out}$
13 PC2$_{out}$
1 PCP$_{out}$
4 VCO$_{out}$
11 R1
12 R2
6 C1$_A$
7 C1$_B$
10 SF$_{out}$
15 Zener

V_{DD} = Pin 16
V_{SS} = Pin 8

CD4051BE

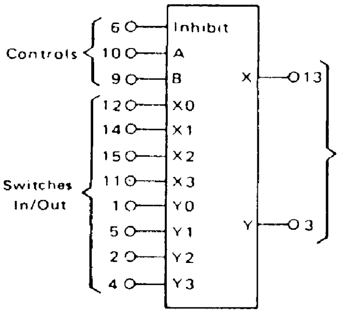
8-Channel Analog
Multiplexer / Demultiplexer


Controls
6 Inhibit
11 A
10 B
9 C
Switches In/Out
13 X0
14 X1
15 X2
12 X3
1 X4
5 X5
2 X6
4 X7
X
3 Common Out/In

V_{DD} = Pin 16
V_{SS} = Pin 8
V_{EE} = Pin 7

CD4052BE

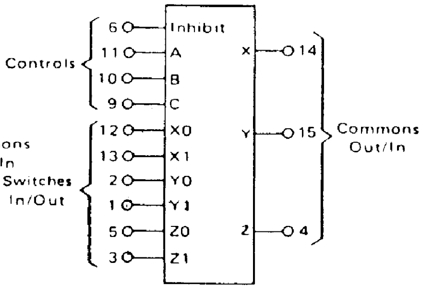
4-Channel Analog
Multiplexer / Demultiplexer


Controls
6 Inhibit
10 A
9 B
Switches In/Out
12 X0
14 X1
15 X2
11 X3
1 Y0
5 Y1
2 Y2
4 Y3
X 13
Y 3
Commons Out/In

V_{DD} = Pin 16
V_{SS} = Pin 8
V_{EE} = Pin 7

CD4053BE

2-Channel Analog
Multiplexer / Demultiplexer


Controls
6 Inhibit
11 A
10 B
9 C
Switches In/Out
12 X0
13 X1
2 Y0
1 Y1
5 Z0
3 Z1
X 14
Y 15
Z 4
Commons Out/In

V_{DD} = Pin 16
V_{SS} = Pin 8
V_{EE} = Pin 7

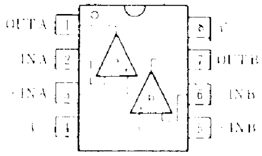
Note: Control Inputs referenced to V_{SS}. Analog Inputs and Outputs reference to V_{EE}. V_{EE} must be $\leqslant V_{SS}$.

TRUTH TABLE

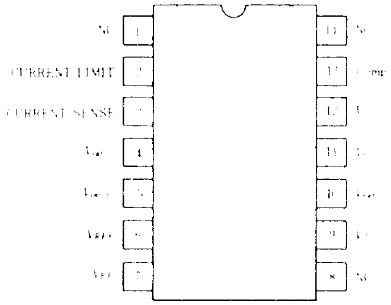
Control Inputs				ON Switches					
	Select								
Inhibit	C*	B	A	MC14051B	MC14052B		MC14053B		
0	0	0	0	X0	Y0	X0	Z0	Y0	X0
0	0	0	1	X1	Y1	X1	Z0	Y0	X1
0	0	1	0	X2	Y2	X2	Z0	Y1	X0
0	0	1	1	X3	Y3	X3	Z0	Y1	X1
0	1	0	0	X4			Z1	Y0	X0
0	1	0	1	X5			Z1	Y0	X1
0	1	1	0	X6			Z1	Y1	X0
0	1	1	1	X7			Z1	Y1	X1
1	x	x	x	None	None		None		

*Not applicable for MC14052
x = Don't Care

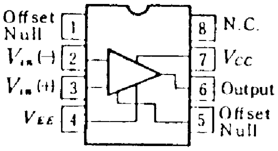
HA17082PS
OP-Amp


OUT A
1
IN A
2
IN A
3
4
8
7
OUT B
6
IN B
5
IN B

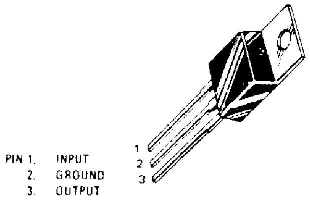
HA17723
Voltage Regulator


NC
1
CURRENT LIMIT
2
CURRENT SENSE
3
4
5
6
7
14
NC
13
12
11
10
9
8
NC

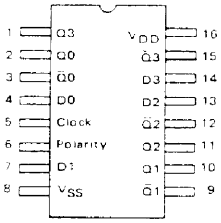
HA17741PS
OP-AMP


Offset Null
1
$V_{in}(-)$
2
$V_{in}(+)$
3
V_{EE}
4
8
N.C.
7
V_{CC}
6
Output
5
Offset Null

HA178M05
HA17806P
HA17812P
Voltage Regulator


PIN 1. INPUT
2. GROUND
3. OUTPUT
1
2
3

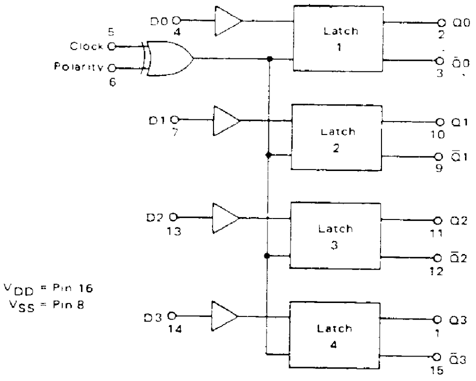
HD14042BP
Latch


1
Q3
2
Q0
3
$\bar{Q}0$
4
D0
5
Clock
6
Polarity
7
D1
8
V_{SS}
V_{DD}
16
$\bar{Q}3$
15
D3
14
D2
13
$\bar{Q}2$
12
Q2
11
Q1
10
$\bar{Q}1$
9

TRUTH TABLE

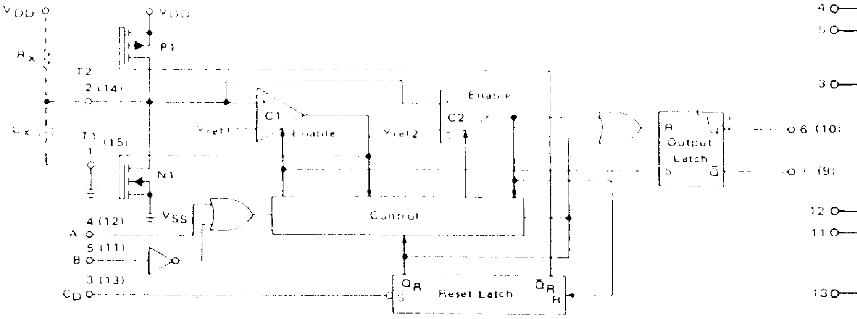
CLOCK	POLARITY	Q
0	0	Data
_⌐	0	Latch
1	1	Data
¬_	1	Latch

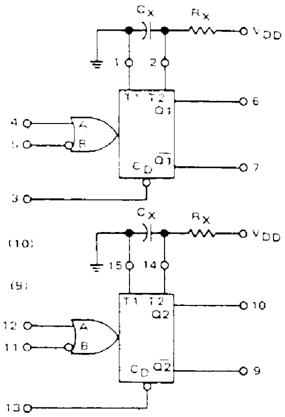
LOGIC DIAGRAM


D0
4
Clock
5
Polarity
6
Latch 1
Q0
2
$\bar{Q}0$
3
D1
7
Latch 2
Q1
10
$\bar{Q}1$
9
D2
13
Latch 3
Q2
11
$\bar{Q}2$
12
D3
14
Latch 4
Q3
1
$\bar{Q}3$
15
V_{DD} = Pin 16
V_{SS} = Pin 8

HD14538BP

Monostable
Multivibrator


V_{DD}
V_{DD}
R_X
P1
T2
2 (14)
C_X
T1 (15)
C1
V_{ref1}
Enable
V_{ref2}
C2
Enable
N1
V_{SS}
4 (12)
A
5 (11)
B
3 (13)
C_D
Control
Q_R
Reset Latch
$\bar{Q}_R$
R
Output Latch
S
Q
$\bar{Q}$
6 (10)
7 (9)

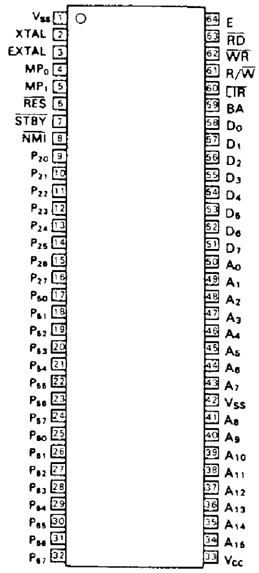

C_X
R_X
V_{DD}
1
2
T1
T2
Q1
$\overline{Q1}$
C_D
4
5
A
B
6
7
3
C_X
R_X
V_{DD}
15
14
T1
T2
Q2
$\overline{Q2}$
C_D
12
11
A
B
10
9
13

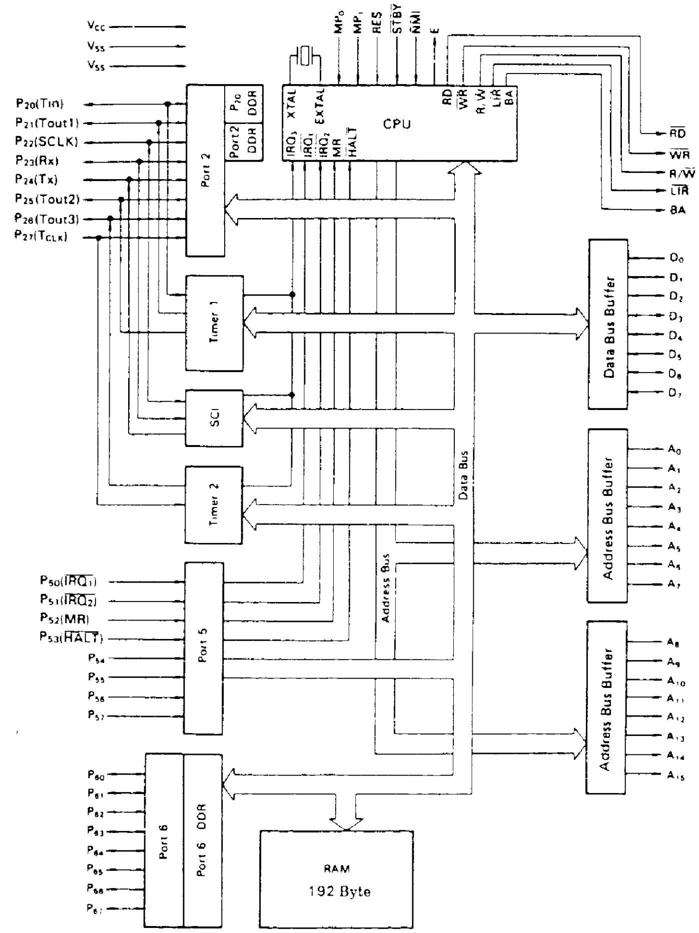
R_X and C_X are external components.

V_{DD} = Pin 16
V_{SS} = Pin 8, Pin 1, Pin 15

HD63B03XP

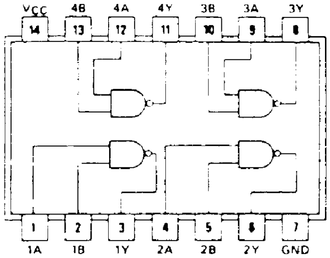
CPU


V_{SS} 1
XTAL 2
EXTAL 3
MP_0 4
MP_1 5
$\overline{RES}$ 6
$\overline{STBY}$ 7
$\overline{NMI}$ 8
P_{20} 9
P_{21} 10
P_{22} 11
P_{23} 12
P_{24} 13
P_{25} 14
P_{26} 15
P_{27} 16
P_{50} 17
P_{51} 18
P_{52} 19
P_{53} 20
P_{54} 21
P_{55} 22
P_{56} 23
P_{57} 24
P_{60} 25
P_{61} 26
P_{62} 27
P_{63} 28
P_{64} 29
P_{65} 30
P_{66} 31
P_{67} 32
64 E
63 $\overline{RD}$
62 $\overline{WR}$
61 $R/\overline{W}$
60 $\overline{LIR}$
59 BA
58 D_0
57 D_1
56 D_2
55 D_3
54 D_4
53 D_5
52 D_6
51 D_7
50 A_0
49 A_1
48 A_2
47 A_3
46 A_4
45 A_5
44 A_6
43 A_7
42 V_{SS}
41 A_8
40 A_9
39 A_{10}
38 A_{11}
37 A_{12}
36 A_{13}
35 A_{14}
34 A_{15}
33 V_{CC}


V_{CC}
V_{SS}
V_{SS}
MP_0
MP_1
RES
$\overline{STBY}$
$\overline{NMI}$
E
P_{20}(Tin)
P_{21}(Tout1)
P_{22}(SCLK)
P_{23}(Rx)
P_{24}(Tx)
P_{25}(Tout2)
P_{26}(Tout3)
P_{27}(T_{CLK})
Port 2
P_{30} DDR
Port2 DDR
XTAL
EXTAL
$\overline{IRQ_3}$
$\overline{IRQ_1}$
$\overline{IRQ_2}$
MR
HALT
CPU
RD
WR
R,W
LIR
BA
$\overline{RD}$
$\overline{WR}$
$R/\overline{W}$
$\overline{LIR}$
BA
Timer 1
SCI
Timer 2
Data Bus
Address Bus
Data Bus Buffer
D_0
D_1
D_2
D_3
D_4
D_5
D_6
D_7
Address Bus Buffer
A_0
A_1
A_2
A_3
A_4
A_5
A_6
A_7
Address Bus Buffer
A_8
A_9
A_{10}
A_{11}
A_{12}
A_{13}
A_{14}
A_{15}
P_{50}($\overline{IRQ_1}$)
P_{51}($\overline{IRQ_2}$)
P_{52}(MR)
P_{53}($\overline{HALT}$)
P_{54}
P_{55}
P_{56}
P_{57}
Port 5
P_{60}
P_{61}
P_{62}
P_{63}
P_{64}
P_{65}
P_{66}
P_{67}
Port 6
Port 6 DDR
RAM
192 Byte

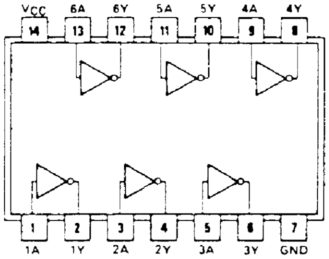
HD74HC00P

2-Input NAND Gates


VCC
4B
4A
4Y
3B
3A
3Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1B
1Y
2A
2B
2Y
GND

HD74HC04P

Inverters


VCC
6A
6Y
5A
5Y
4A
4Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1Y
2A
2Y
3A
3Y
GND

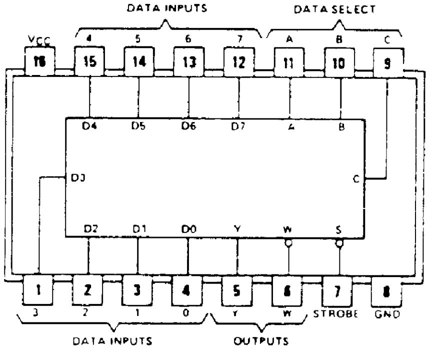
HD74HC151P

Multiplexers

FUNCTION TABLE

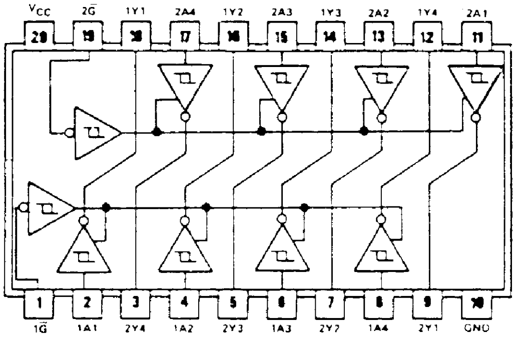
INPUTS				OUTPUTS	
SELECT			STROBE	Y	W
C	B	A	S		
X	X	X	H	L	H
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

H = high level, L = low level, X = irrelevant


DATA INPUTS
DATA SELECT
VCC
4
5
6
7
A
B
C
16
15
14
13
12
11
10
9
D4
D5
D6
D7
A
B
D3
C
D2
D1
D0
Y
W
S
1
2
3
4
5
6
7
8
3
2
1
0
Y
W
STROBE
GND
DATA INPUTS
OUTPUTS

HD74HC244P

Buffers / Line Drivers / Line Receivers


VCC
2G̅
1Y1
2A4
1Y2
2A3
1Y3
2A2
1Y4
2A1
20
19
18
17
16
15
14
13
12
11
1
2
3
4
5
6
7
8
9
10
1G̅
1A1
2Y4
1A2
2Y3
1A3
2Y2
1A4
2Y1
GND

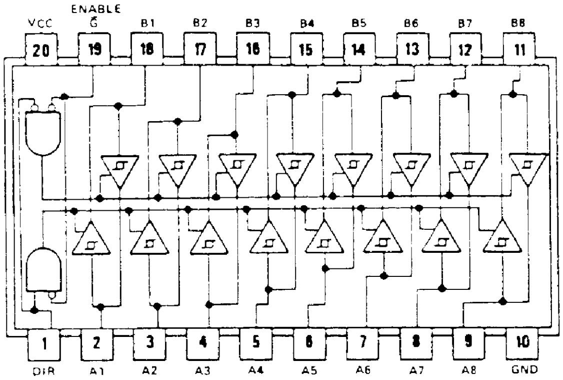
HD74HC245P

Bus Tranceivers

FUNCTION TABLE

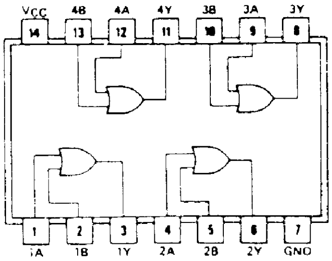
ENABLE $\overline{G}$	DIRECTION CONTROL DIR	OPERATION
L	L	B data to A bus
L	H	A data to B bus
H	X	isolation

H = high level, L = low level, X = irrelevant


VCC
ENABLE $\overline{G}$
B1
B2
B3
B4
B5
B6
B7
B8
20
19
18
17
16
15
14
13
12
11
1
2
3
4
5
6
7
8
9
10
DIR
A1
A2
A3
A4
A5
A6
A7
A8
GND

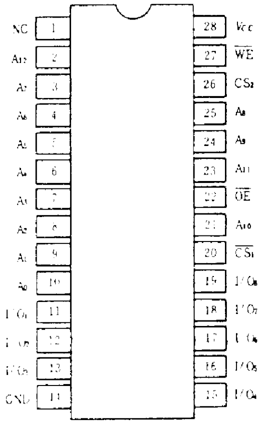
HD74HC32P

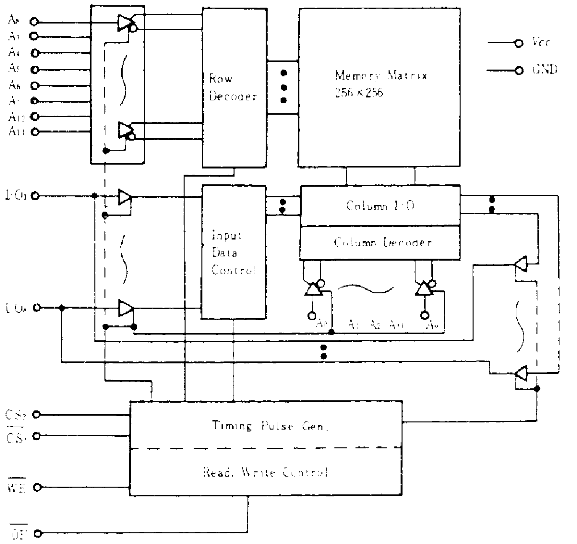
2-Input OR Gates


VCC
4B
4A
4Y
3B
3A
3Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1B
1Y
2A
2B
2Y
GND

HM6264LP-15

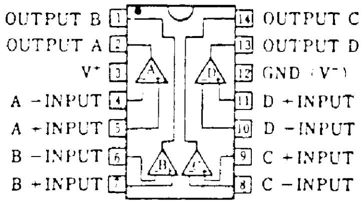
8192-word × 8-Bit RAM


NC
1
A_{12}
2
A_7
3
A_6
4
A_5
5
A_4
6
A_3
7
A_2
8
A_1
9
A_0
10
I/O_1
11
I/O_2
12
I/O_3
13
GND
14
28
Vcc
27
$\overline{WE}$
26
CS_2
25
A_8
24
A_9
23
A_{11}
22
$\overline{OE}$
21
A_{10}
20
$\overline{CS_1}$
19
I/O_8
18
I/O_7
17
I/O_6
16
I/O_5
15
I/O_4


Row Decoder
Memory Matrix 256×256
Vcc
GND
I/O_1
I/O_8
Input Data Control
Column I/O
Column Decoder
CS_2
$\overline{CS_1}$
$\overline{WE}$
$\overline{OE}$
Timing Pulse Gen.
Read, Write Control

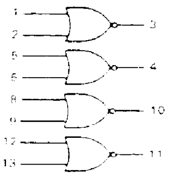
9. IC DATA

MB4204
Comparator



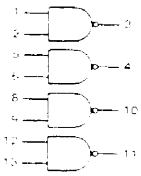
OUTPUT B 1
OUTPUT A 2
V+ 3
A −INPUT 4
A +INPUT 5
B −INPUT 6
B +INPUT 7
8 C −INPUT
9 C +INPUT
10 D −INPUT
11 D +INPUT
12 GND (V−)
13 OUTPUT D
14 OUTPUT C
A
B
C
D

MC14001BCP
MC14001UBCP
2-Input NOR Gate



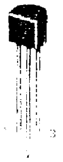
1
2
3
5
6
4
8
9
10
12
13
11

MC14011BCP
2-Input NAND Gate



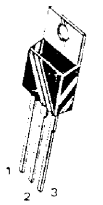
1
2
3
5
6
4
8
9
10
12
13
11

MC78L05CP
Voltage Regulator



Pin 1 Output
2. Ground
3 Input

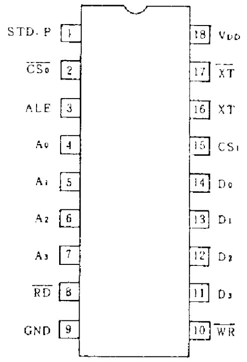
MC7906CT
Voltage Regulator



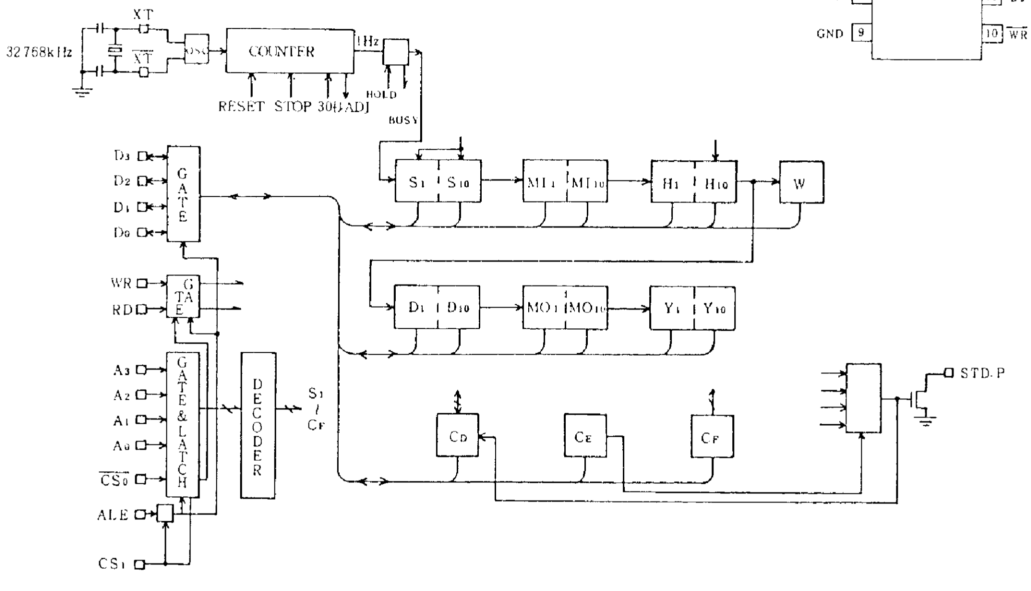
Pin 1 Ground
2. Input
3. Output

(Heatsink surface
connected to Pin2)

MSM6242RS
Realtime Clock

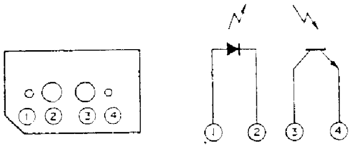


STD. P 1
$\overline{CS_0}$ 2
ALE 3
A0 4
A1 5
A2 6
A3 7
$\overline{RD}$ 8
GND 9
18 VDD
17 $\overline{XT}$
16 XT
15 CS1
14 D0
13 D1
12 D2
11 D3
10 $\overline{WR}$

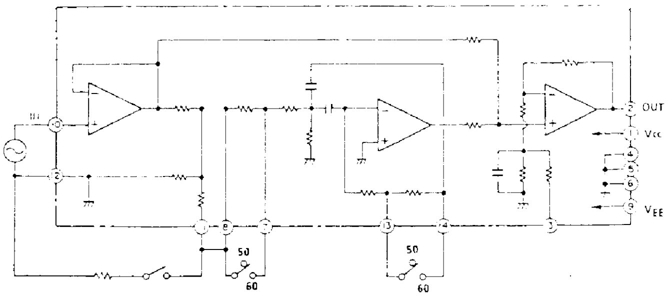


XT
$\overline{XT}$
32.768kHz
OSC
COUNTER
1Hz
RESET
STOP
30S ADJ
HOLD
BUSY
D3
D2
D1
D0
GATE
WR
RD
GATE
A3
A2
A1
A0
$\overline{CS_0}$
ALE
CS1
GATE & LATCH
DECODER
S1 / CF
S1
S10
MI1
MI10
H1
H10
W
D1
D10
MO1
MO10
Y1
Y10
CD
CE
CF
STD.P

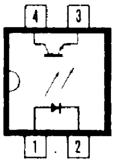
NJL5142EL-A
Photo Reflector



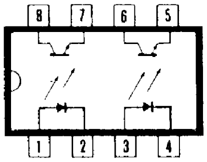
NP2014B
50/60 Notch Filter


IN
OUT
Vcc
VEE
50
60
50
60

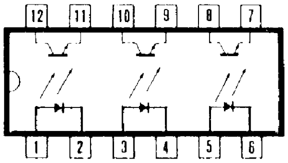
PC-827
Photocoupler



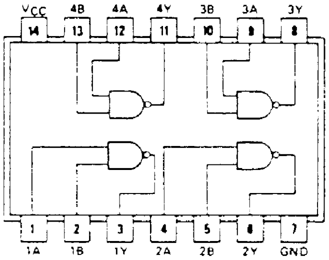
PC817
Photocoupler



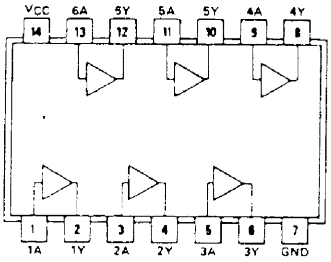
PC837
Photocoupler


12
11
10
9
8
7
1
2
3
4
5
6

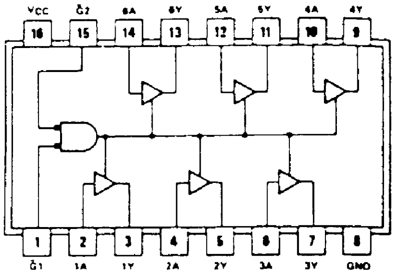
SN74HC03N
2-Input NAND Gates


VCC
4B
4A
4Y
3B
3A
3Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1B
1Y
2A
2B
2Y
GND

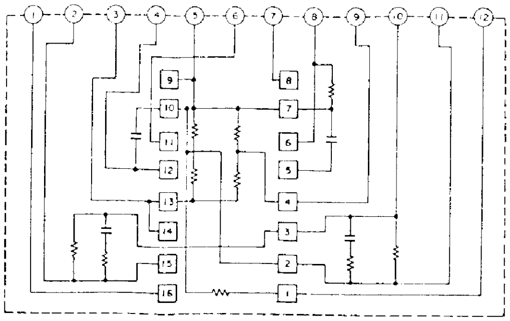
SN74LS07
Buffers / Drivers


VCC
6A
5Y
5A
5Y
4A
4Y
14
13
12
11
10
9
8
1
2
3
4
5
6
7
1A
1Y
2A
2Y
3A
3Y
GND

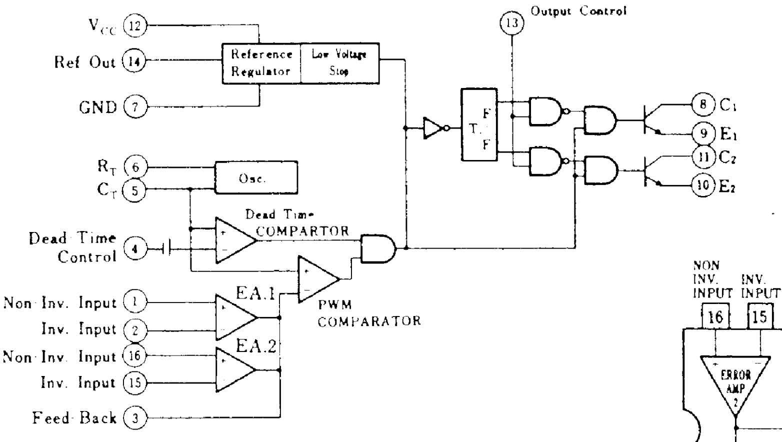
SN74LS365
Bus Drivers


VCC
Ḡ2
6A
6Y
5A
5Y
4A
4Y
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
Ḡ1
1A
1Y
2A
2Y
3A
3Y
GND

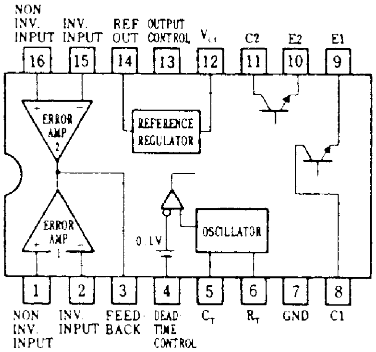
SWC-01
Switching Regulator Contoroller


1
2
3
4
5
6
7
8
9
10
11
12
9
10
11
12
13
14
15
16
8
7
6
5
4
3
2
1

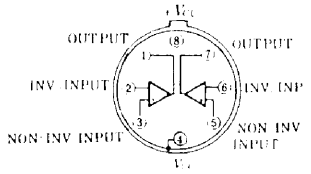
μPC494G is connecteed to [1] ~ [16].


Output Control
13
V$_{CC}$ 12
Ref Out 14
GND 7
Reference Regulator
Low Voltage Stop
T.F
F
F
8 C1
9 E1
11 C2
10 E2
R$_T$ 6
C$_T$ 5
Osc.
Dead Time COMPARTOR
Dead Time Control 4
PWM COMPARATOR
EA.1
EA.2
Non Inv. Input 1
Inv. Input 2
Non Inv. Input 16
Inv. Input 15
Feed Back 3

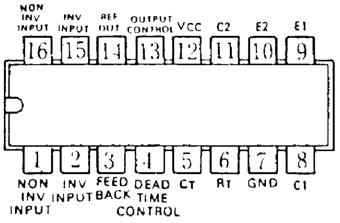
Blockdiagram of μPC494G.

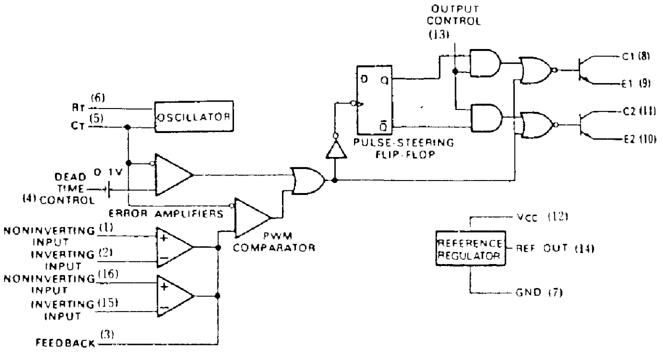

NON INV. INPUT
INV. INPUT
REF OUT
OUTPUT CONTROL
V$_{CC}$
C2
E2
E1
16
15
14
13
12
11
10
9
ERROR AMP 2
REFERENCE REGULATOR
ERROR AMP 1
0.1V
OSCILLATOR
1
2
3
4
5
6
7
8
NON INV. INPUT
INV. INPUT
FEED BACK
DEAD TIME CONTROL
C$_T$
R$_T$
GND
C1

TL072CP
OP Amp

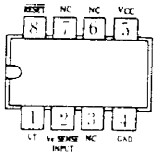

+Vcc
OUTPUT
(8)
1
7
OUTPUT
INV INPUT
2
6
INV INP
3
5
NON-INV INPUT
4
NON INV INPUT
V-

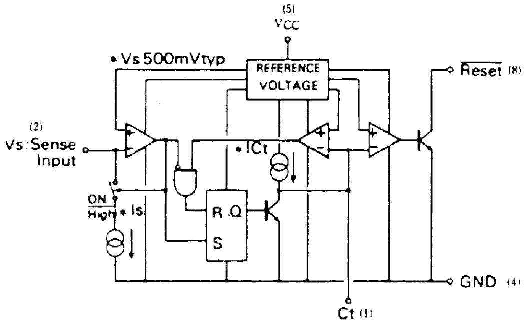
TL494CN
PWM Switching
Regulator Controller


NON INV INPUT
INV INPUT
REF OUT
OUTPUT CONTROL
VCC
C2
E2
E1
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
NON INV INPUT
INV INPUT
FEED BACK
DEAD TIME CONTROL
CT
RT
GND
C1


OUTPUT CONTROL (13)
RT (6)
CT (5)
OSCILLATOR
D
Q
Q̄
PULSE-STEERING FLIP-FLOP
C1 (8)
E1 (9)
C2 (11)
E2 (10)
DEAD TIME (4) CONTROL
0 1V
ERROR AMPLIFIERS
PWM COMPARATOR
NONINVERTING INPUT (1)
INVERTING INPUT (2)
NONINVERTING INPUT (16)
INVERTING INPUT (15)
FEEDBACK (3)
+
−
+
−
VCC (12)
REFERENCE REGULATOR
REF OUT (14)
GND (7)

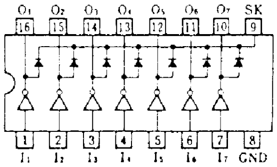
TL7700C
Voltage Monitor


RESET
NC
NC
VCC
8
7
6
5
1
2
3
4
CT
Vs SENSE INPUT
NC
GND


(5)
VCC
• Vs 500mVtyp
REFERENCE VOLTAGE
Reset (8)
(2)
Vs: Sense Input
+
−
+
−
+
−
• ICt
ON
High
• Is
R Q
S
GND (4)
Ct (1)

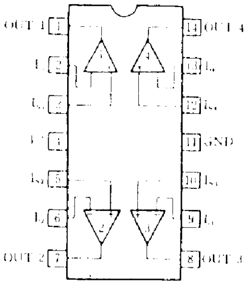
9. IC DATA

μPA2004C
Transister Array

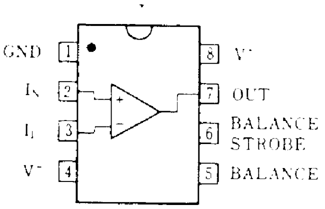

O1
O2
O3
O4
O5
O6
O7
SK
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
I1
I2
I3
I4
I5
I6
I7
GND

I : Input(Base)
O : Output(Collector)
GND(Common Emitter)

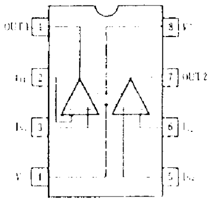
μPC1458C
μPC324C
OP Amp


OUT 1
1
I-1
2
I+1
3
V+
4
I+2
5
I-2
6
OUT 2
7
OUT 4
14
I-4
13
I+4
12
GND
11
I+3
10
I-3
9
OUT 3
8
1
2
3
4

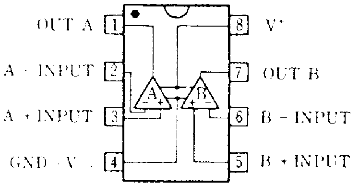
μPC271C
Comparator


GND
1
IN
2
II
3
V-
4
V+
8
OUT
7
BALANCE
STROBE
6
BALANCE
5
+
-

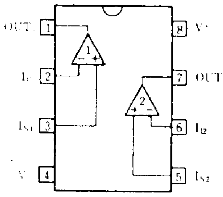
μPC358C
OP Amp


OUT1
1
I-1
2
I+1
3
V-
4
V+
8
OUT2
7
I-2
6
I+2
5

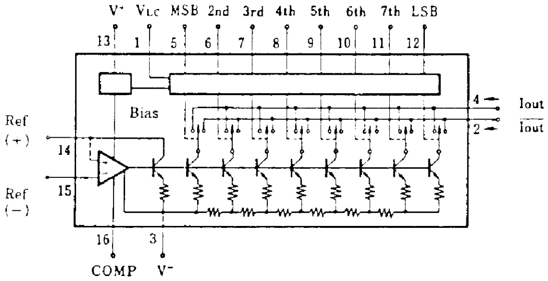
μPC393C
Comparator

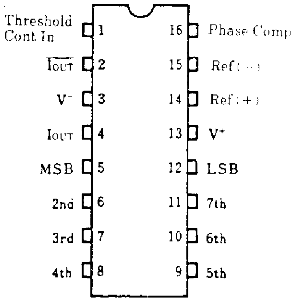

OUT A
1
A - INPUT
2
A + INPUT
3
GND (V-)
4
V+
8
OUT B
7
B - INPUT
6
B + INPUT
5
A
B

μPC4570C
OP Amp

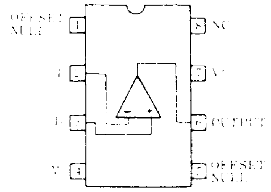

OUT1
1
I-1
2
I+1
3
V-
4
V+
8
OUT2
7
I-2
6
I+2
5
1
2
-
+

μPC624C
8-Bit D/A Converter

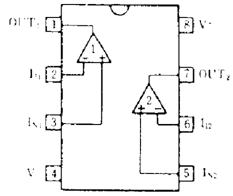

V+
VLC
MSB
2nd
3rd
4th
5th
6th
7th
LSB
13
1
5
6
7
8
9
10
11
12
Bias
Ref (+)
14
Ref (−)
15
4
Iout
2
$\overline{\text{Iout}}$
16
3
COMP
V-


Threshold
Cont In
1
$\overline{\text{IOUT}}$
2
V-
3
IOUT
4
MSB
5
2nd
6
3rd
7
4th
8
16
Phase Comp
15
Ref(−)
14
Ref(+)
13
V+
12
LSB
11
7th
10
6th
9
5th

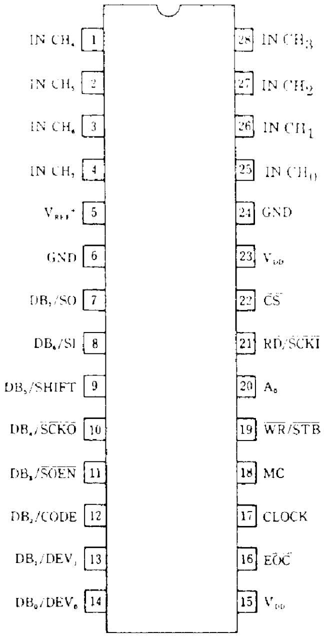
µPC811C
OP Amp

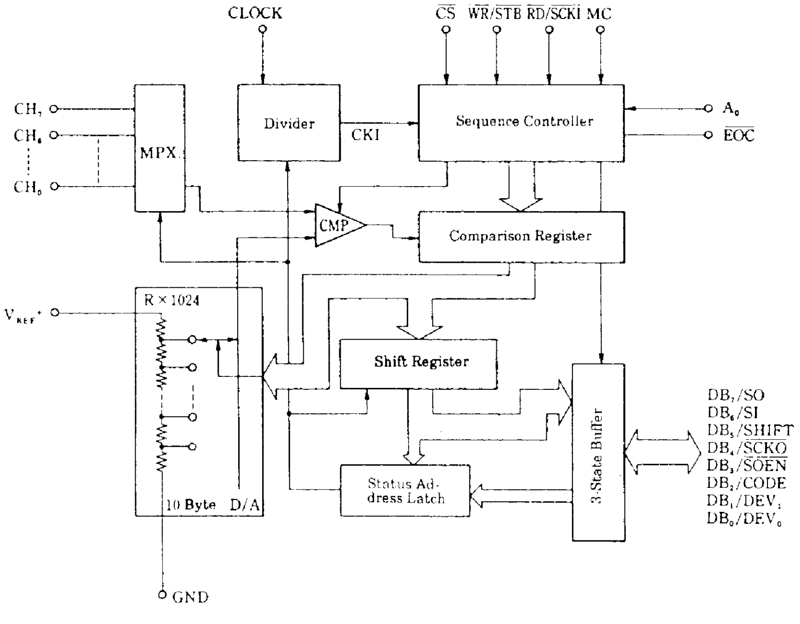

OFFSET NULL
1
I
2
I
3
V
4
8
NC
7
V
6
OUTPUT
5
OFFSET NULL
−
+

µPC812C
OP Amp


OUT₁
1
I₁₁
2
I_N1
3
V
4
8
V
7
OUT₂
6
I₁₂
5
I_N2
1
2
−
+

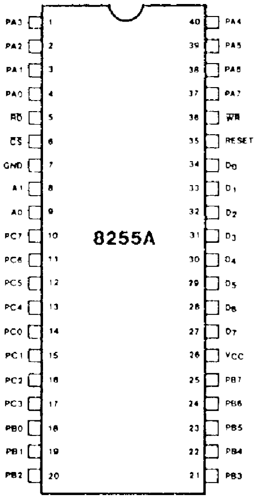
µPD-7004C
10-Bit A/D Converter

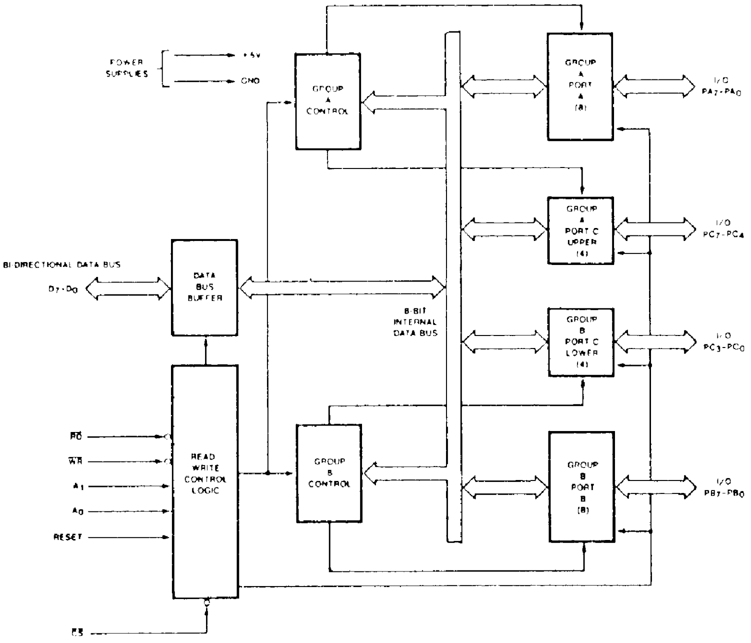

IN CH₄
1
IN CH₅
2
IN CH₆
3
IN CH₇
4
V_REF⁺
5
GND
6
DB₇/SO
7
DB₆/SI
8
DB₅/SHIFT
9
DB₄/SCKO
10
DB₃/SOEN
11
DB₂/CODE
12
DB₁/DEV₁
13
DB₀/DEV₀
14
28
IN CH₃
27
IN CH₂
26
IN CH₁
25
IN CH₀
24
GND
23
V_DD
22
CS
21
RD/SCKI
20
A₀
19
WR/STB
18
MC
17
CLOCK
16
EOC
15
V_DD


CLOCK
CS
WR/STB
RD/SCKI
MC
CH₇
CH₆
CH₀
MPX
Divider
CKI
Sequence Controller
A₀
EOC
CMP
Comparison Register
V_REF⁺
R × 1024
10 Byte D/A
Shift Register
Status Address Latch
3-State Buffer
DB₇/SO
DB₆/SI
DB₅/SHIFT
DB₄/SCKO
DB₃/SOEN
DB₂/CODE
DB₁/DEV₁
DB₀/DEV₀
GND

μPD71055C

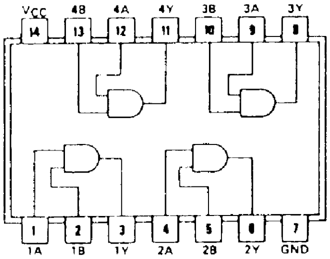
Programmable
Peripheral Interface


8255A
PA3 1
PA2 2
PA1 3
PA0 4
RD 5
CS 6
GND 7
A1 8
A0 9
PC7 10
PC6 11
PC5 12
PC4 13
PC0 14
PC1 15
PC2 16
PC3 17
PB0 18
PB1 19
PB2 20
40 PA4
39 PA5
38 PA6
37 PA7
36 WR
35 RESET
34 D0
33 D1
32 D2
31 D3
30 D4
29 D5
28 D6
27 D7
26 VCC
25 PB7
24 PB6
23 PB5
22 PB4
21 PB3


POWER SUPPLIES
+5V
GND
GROUP A CONTROL
GROUP A PORT A (8)
I/O PA7-PA0
GROUP A PORT C UPPER (4)
I/O PC7-PC4
BI-DIRECTIONAL DATA BUS
D7-D0
DATA BUS BUFFER
8-BIT INTERNAL DATA BUS
GROUP B PORT C LOWER (4)
I/O PC3-PC0
RD
WR
A1
A0
RESET
READ WRITE CONTROL LOGIC
GROUP B CONTROL
GROUP B PORT B (8)
I/O PB7-PB0
CS

μPD74HC08C

2-Input AND Gates

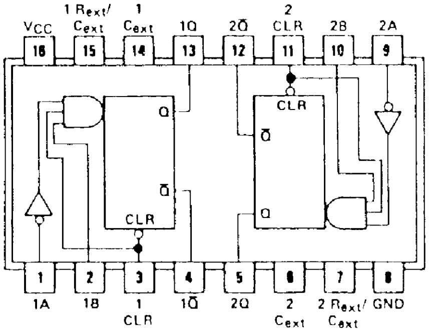

VCC 14
4B 13
4A 12
4Y 11
3B 10
3A 9
3Y 8
1 1A
2 1B
3 1Y
4 2A
5 2B
6 2Y
7 GND

μPD74HC123C

Retriggerable
Monostable
Multivibrator

'123, 'L123, 'LS123
FUNCTION TABLE

INPUTS			OUTPUTS	
CLEAR	A	B	Q	$\bar{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↑	⊓	⊔
H	↓	H	⊓	⊔
↑	L	H	⊓	⊔

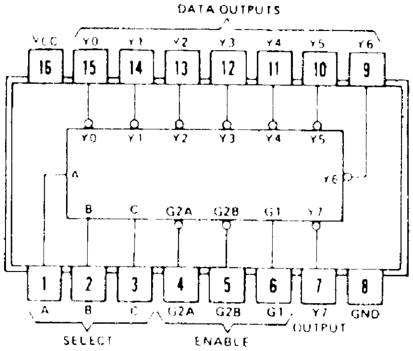

VCC 16
1 Rext/Cext 15
1 Cext 14
1Q 13
2Q̄ 12
2 CLR 11
2B 10
2A 9
Q
Q̄
CLR
Q̄
Q
CLR
1 1A
2 1B
3 1 CLR
4 1Q̄
5 2Q
6 2 Cext
7 2 Rext/Cext
8 GND

μPD74HC138C
Decoders / Demultiplexer

'LS138, S138
FUNCTION TABLE

INPUTS					OUTPUTS							
ENABLE		SELECT										
G1	G2*	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	H	H	H	L	H	H	H	H
H	L	H	L	L	H	H	H	H	L	H	H	H
H	L	H	L	H	H	H	H	H	H	L	H	H
H	L	H	H	L	H	H	H	H	H	H	L	H
H	L	H	H	H	H	H	H	H	H	H	H	L

*G2 = G2A + G2B
H = high level, L = low level, X = irrelevant

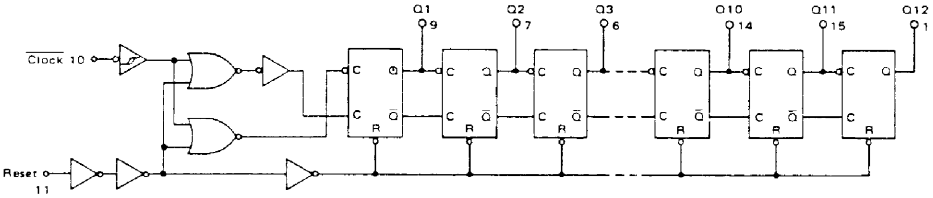

DATA OUTPUTS
VCC
Y0
Y1
Y2
Y3
Y4
Y5
Y6
16
15
14
13
12
11
10
9
Y0
Y1
Y2
Y3
Y4
Y5
A
Y6
B
C
G2A
G2B
G1
Y7
1
2
3
4
5
6
7
8
A
B
C
G2A
G2B
G1
Y7
GND
OUTPUT
SELECT
ENABLE

μPD74HC4040C
12-Bit Binary Counter

TRUTH TABLE

CLOCK	RESET	OUTPUT STATE
↑	0	No Change
↓	0	Advance to next state
X	1	All Outputs are low

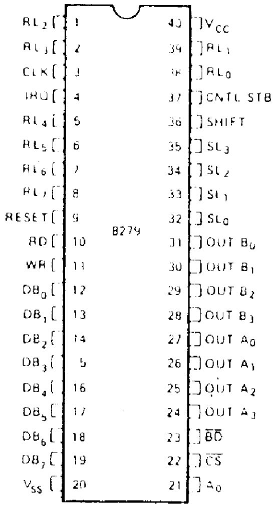
X = Don't Care

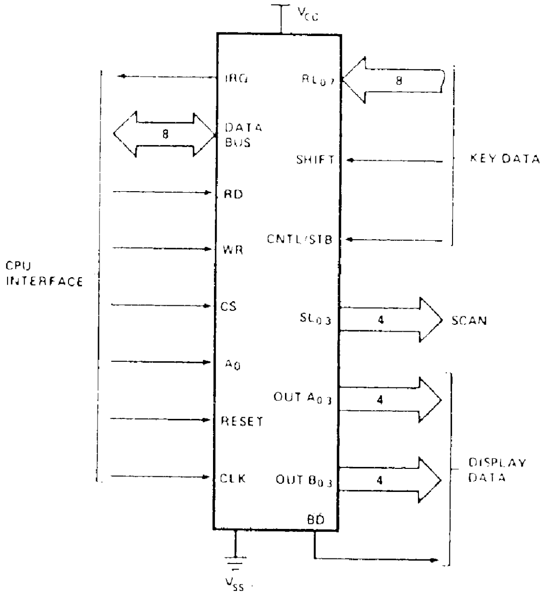

Q1
9
Q2
7
Q3
6
Q10
14
Q11
15
Q12
1
Clock 10
Reset
11
C
Q
C
Q̄
R

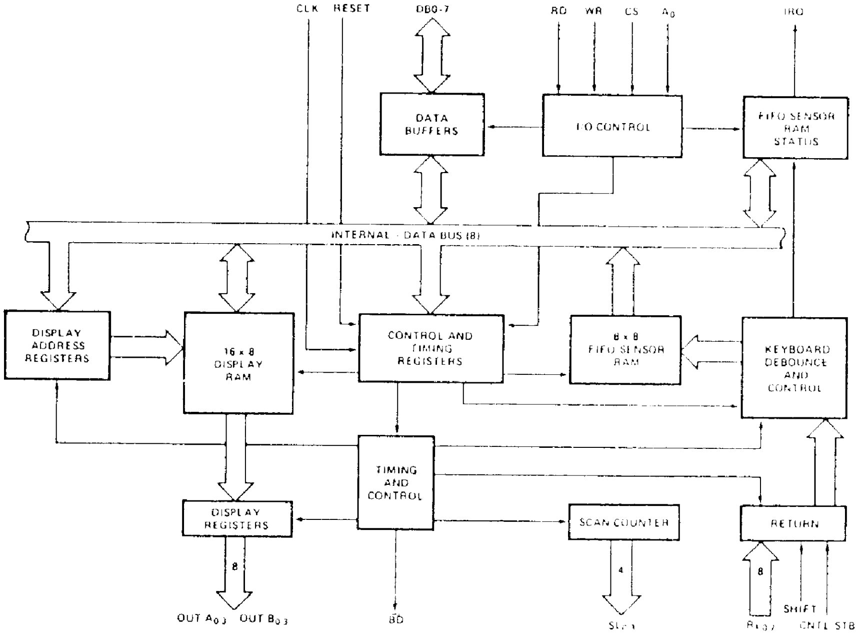
Q4 = Pin 5 Q7 = Pin 4
Q5 = Pin 3 Q8 = Pin 13
Q6 = Pin 2 Q9 = Pin 12

V_{DD} = Pin 16
V_{SS} = Pin 8

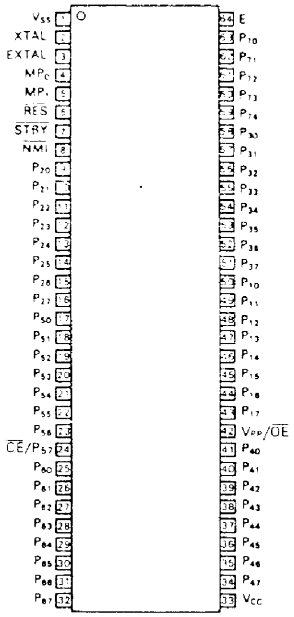
μPD8279C-2
Programmable Keyboard / Interface


RL2 1
RL3 2
CLK 3
IRQ 4
RL4 5
RL5 6
RL6 7
RL7 8
RESET 9
RD 10
WR 11
DB0 12
DB1 13
DB2 14
DB3 15
DB4 16
DB5 17
DB6 18
DB7 19
VSS 20
8279
40 VCC
39 RL1
38 RL0
37 CNTL STB
36 SHIFT
35 SL3
34 SL2
33 SL1
32 SL0
31 OUT B0
30 OUT B1
29 OUT B2
28 OUT B3
27 OUT A0
26 OUT A1
25 OUT A2
24 OUT A3
23 BD
22 CS
21 A0

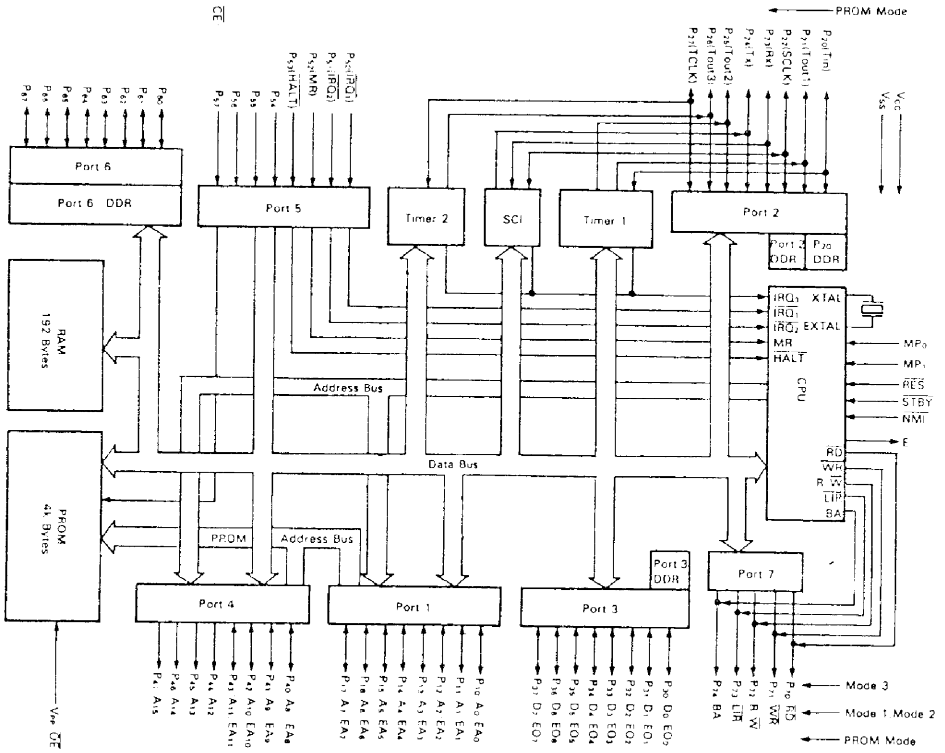

VCC
CPU INTERFACE
IRQ
DATA BUS
8
RD
WR
CS
A0
RESET
CLK
RL0-7
8
SHIFT
CNTL/STB
KEY DATA
SL0-3
4
SCAN
OUT A0-3
4
OUT B0-3
4
DISPLAY DATA
BD
VSS


CLK
RESET
DB0-7
RD
WR
CS
A0
IRQ
DATA BUFFERS
I/O CONTROL
FIFO/SENSOR RAM STATUS
INTERNAL DATA BUS (8)
DISPLAY ADDRESS REGISTERS
16 × 8 DISPLAY RAM
CONTROL AND TIMING REGISTERS
8 × 8 FIFO/SENSOR RAM
KEYBOARD DEBOUNCE AND CONTROL
TIMING AND CONTROL
DISPLAY REGISTERS
SCAN COUNTER
RETURN
8
OUT A0-3
OUT B0-3
BD
4
SL0-3
8
RL0-7
SHIFT
CNTL STB

HD637B01X0
CPU



Vss 1
XTAL 2
EXTAL 3
MP0 4
MP1 5
RES 6
STBY 7
NMI 8
P20 9
P21 10
P22 11
P23 12
P24 13
P25 14
P26 15
P27 16
P50 17
P51 18
P52 19
P53 20
P54 21
P55 22
P56 23
CE/P57 24
P60 25
P61 26
P62 27
P63 28
P64 29
P65 30
P66 31
P67 32
64 E
63 P70
62 P71
61 P72
60 P73
59 P74
58 P30
57 P31
56 P32
55 P33
54 P34
53 P35
52 P36
51 P37
50 P10
49 P11
48 P12
47 P13
46 P14
45 P15
44 P16
43 P17
42 Vpp/OE
41 P40
40 P41
39 P42
38 P43
37 P44
36 P45
35 P46
34 P47
33 Vcc



CE
PROM Mode
P67 P66 P65 P64 P63 P62 P61 P60
P57 P56 P55 P54 P53(HALT) P52(MR) P51(IRQ2) P50(IRQ1)
P27(TCLK) P26(Tout3) P25(Tout2) P24(Tx) P23(Rx) P22(SCLK) P21(Tout1) P20(Tin)
Vcc
Vss
Port 6
Port 6 DDR
Port 5
Timer 2
SCI
Timer 1
Port 2
Port 2 DDR
P20 DDR
RAM 192 Bytes
PROM 4k Bytes
IRQ3
IRQ1
IRQ2
MR
HALT
XTAL
EXTAL
CPU
MP0
MP1
RES
STBY
NMI
E
RD
WR
R/W
LIR
BA
Address Bus
Data Bus
PROM
Address Bus
Port 4
Port 1
Port 3
Port 3 DDR
Port 7
P47 A15
P46 A14
P45 A13
P44 A12
P43 A11 EA11
P42 A10 EA10
P41 A9 EA9
P40 A8 EA8
P17 A7 EA7
P16 A6 EA6
P15 A5 EA5
P14 A4 EA4
P13 A3 EA3
P12 A2 EA2
P11 A1 EA1
P10 A0 EA0
P37 D7 EO7
P36 D6 EO6
P35 D5 EO5
P34 D4 EO4
P33 D3 EO3
P32 D2 EO2
P31 D1 EO1
P30 D0 EO0
P74 BA
P73 LIR
P72 R/W
P71 WR
P70 RD
Mode 3
Mode 1 Mode 2
PROM Mode
Vpp OE

Section 10 SIGNAL ABBREVIATION LIST

* : Used within one PCB

Symbol	Function
AC	AC power detection
ADCLK*	Clock pulse for A/D convertor
ART	Artifact (leads off) signal for telemeter
AUX	Auxiliary input
A0 ~ A15*	Address
BA*	Bus available
BACK UP*	Back up power supply of lithium battery
BAT +	Battery terminal, positive
BAT −	Battery terminal, negative
BATTCHG	"BATT CHG" (battery charging) LED control
BATTOFF	Battery power off
BELLADJ	Beep volume control out
BELLIN	Beep volume control in
BELLOUT	Beep out
BLANK	Blanking pulse for CRT
BRIGHT	Sync spot display control
BUCONT*	Battery back up control for host CPU RAM and ECG CPU RAM
C	Chest lead ECG
CAL *	Calibration control
CALDISP *	Calibration display control
CALL	Nurse call signal from transmitter
CHANNEL AD	Voltage corresponding to channel being received via optional receiver
CHGAD	Charged voltage for A/D conversion
CHGLED	Charge LED display control
CHGON	Energy charge control
CH1 /CH2	CH1 / CH2 trace selection
CLK	Clock signal for serial communication with optional unit
CNTL	CAL key entry
CSAD *	Chip select for A/D converter
CSCRT *	Chip select for CRT RAM and gate control for CRT CPU data bus buffer
CSECG *	Chip select for ECG RAM and direction control for ECG CPU data bus buffer
CSRAM	Chip select for host CPU RAM

10. SIGNAL ABBREVIATION LIST

* : Used within one PCB

Symbol	Function
CSRAM-A	Chip select for ECG CPU RAM
DCHGCHK	Discharge check
DIP0	Time constant selection (ECG / MON)
DIP1	AC filter on / off
DIP2	Alarm recording on / off
DIP3	Auto recording on / off
DIP4	Paper sensitivity, high / low
DIP5	Lead all / P, I , II , III
DIP6	Recording mode, realtime / delay
DIP7	Paddle sync on / off
DISPSEL	Display mode select key
DISP0 ~ DISP2 *	LED display control
D0 ~ D7	Data bus
E_A	Ground for analog circuits
E_D	Ground for digital circuits
E_R	Ground for recorder
E_Y	Ground for CRT
ECGOUT	ECG signal for A/D conversion in optional unit
ECHG	Ground for + 12 V
ENB	Recording enable
ENRGADJ	Energy adjustment voltage
ESEL0 ~ ESEL3	Energy selector switch position code
EOC *	End of A / D conversion
EXCHG	Charge signal form paddle
EXDISCHG	Discharge signal form paddle
EXIST	Not used
EXTRLY	External discharge relay control
EXTECG	External ECG output
FEEDA	Paper sensor, anode
FEEDC	Paper sensor, collector
FEEDE	Paper sensor, emitter
FEEDK	Paper sensor, cathode

* : Used within one PCB

Symbol	Function
GAIN0 ~ GAIN2 *	ECG gain contol
HALTCRT	Halt signal for CRT CPU
HALTECG	Halt signal for ECG CPU
HSYNC	Syncronization signal for horizontal deflection
HUMFIL	AC filter control
INST *	INST (reset) control
INST-1*	INST control
INST-2	Not used
INTRLY	Internal discharage relay control
INTEN1 ~ INTEN3 *	Intensity control VR terminals
LA	ECG signal, left arm
LED +	Battery detection switch, commom
LED –	Battery detection switch
LEDGR	Paddle LED control, green
LEDRED	Paddle LED control, red
LEDYEL	Paddle LED control, yellow
LFAULT	Lead fault (leads off)
LL	ECG signal, left leg
LOWCUT *	Low cut filter control
LURCOM	Thermal head detection switch, common
LURNO	Thermal head detection switch, normally open
MAKPLS	Not used
MOTOR1 ~ MOTOR2	Motor drive sisgnal
NOPAPER	Thermal head and paper detection
OPTION*	Select signal of ECG from interface unit
OP.ECGx5	ECG signal (5mV/mV) from interface unit
OVERCHG	Overcharge detection
PADL1~ PADL2	Paddle type discrimination
PCREF *	Clock for paddle contact excitor, 50KHz
PCAD	Paddle contact signal for A / D conversion
PECGA	Paddle lead ECG, apex
PECGS	Paddle lead ECG, sternum

10. SIGNAL ABBREVIATION LIST

* : Used within one PCB

Symbol	Function
POWERON	Power on signal from energy selector
PRTCLK	Clock for recorder
RA	ECG signal, right arm
RCVFLT	Receiving fault
RD *	Read
REC	Recorder motor control
REF *	Reference voltage +4 V
RL	ECG signal, right leg
RST *	Reset for all CPUs
RTC *	Realtime clock, 2 ms
R0 ~ R3	Return line from sheet key
RxD	Reception data for serial communication with optional unit
SEL0 ~ SEL4 *	Input selection control
SENSA	Paper sensor, anode
SENSC	Paper sensor, collector
SENSE	Paper sensor, emitter
SENSK	Paper sensor, cathode
SENSOUT	Rotation sensor output
SENS +	Rotation sensor, positive
SENS −	Rotation sensor, negative
SH	Shield for ECG signal
SIN	Recording data (Serial in)
SOUT	Recording data of the previous line to avoid successive printing (Serial out)
STB	Strobe signal for recorder
S0 ~ S3	Scan line for sheet key entry and LED display control
TCLK *	Clock for test waveform
TC 0.1*	Select signal of time constant of 0.1 sec
TELE	Telemetry singal receiving
TELEW	Telemetry waveform
TTROUT	Integrated value of change of discharge current (output of TTR measuring circuit)
TTRRST	Reset for TTR measuring circuit

* : Used within one PCB

Symbol	Function
TxD	Transmission data for serial communication with optional unit
VSYNC	Synchronization signal for vertical deflection
WAVE /CHR	Waveform / character selection control
WR *	Write
X1, X2	Horizontal deflection yoke signal
YSIG	Waveform signal for CRT
YP1, YP2	Vertical deflection poisition yoke signal
Y1, Y2	Vertical deflection yoke signal
ZBB	Transmitter battery level low signal
ZBECG +	Transmitter ECG signal
50KHz *	ECG floating clock
8MHzCLK	Clock for CPU
+ 5V	+ 5 V for digital circuits
− 6V	− 6 V for analog circuits
+ 6V	+ 6 V foranalog circuits
− 8.5V	− 8.5V for CRT
+ 8.5V	+ 8.5V for CRT
+ 12VCHG	Unregulated + 12 V
+ 12V	+ 12 V for CRT
+ 12VREC	+ 12 V for recorder
+ 12V$_B$	Unregulated + 12 V
12MHz CLK*	Clock of host CPU and ECG CPU
25/5 mm/s	Paper speed selection

Section 11 CIRCUITS DIAGRAMS & PARTS LOCATIONS

CONTENTS

DWG NO. PAGE

TEC-7100
TEC-7200

BOARD CONNECTION -------------------- 104783 11.1
CONNECTOR PIN ASSIGNMENT (1 / 3) -------- 104711 11.3
CONNECTOR PIN ASSIGNMENT (2 / 3) -------- 104712 11.4
CONNECTOR PIN ASSIGNMENT (3 / 3) -------- 104713 11.5

TEC-7300

BOARD CONNECTION -------------------- 105560 11.41
CONNECTOR PIN ASSIGNMENT (1 / 3) -------- 105556 11.43
CONNECTOR PIN ASSIGNMENT (2 / 3) -------- 105557 11.44
CONNECTOR PIN ASSIGNMENT (3 / 3) -------- 105558 11.45

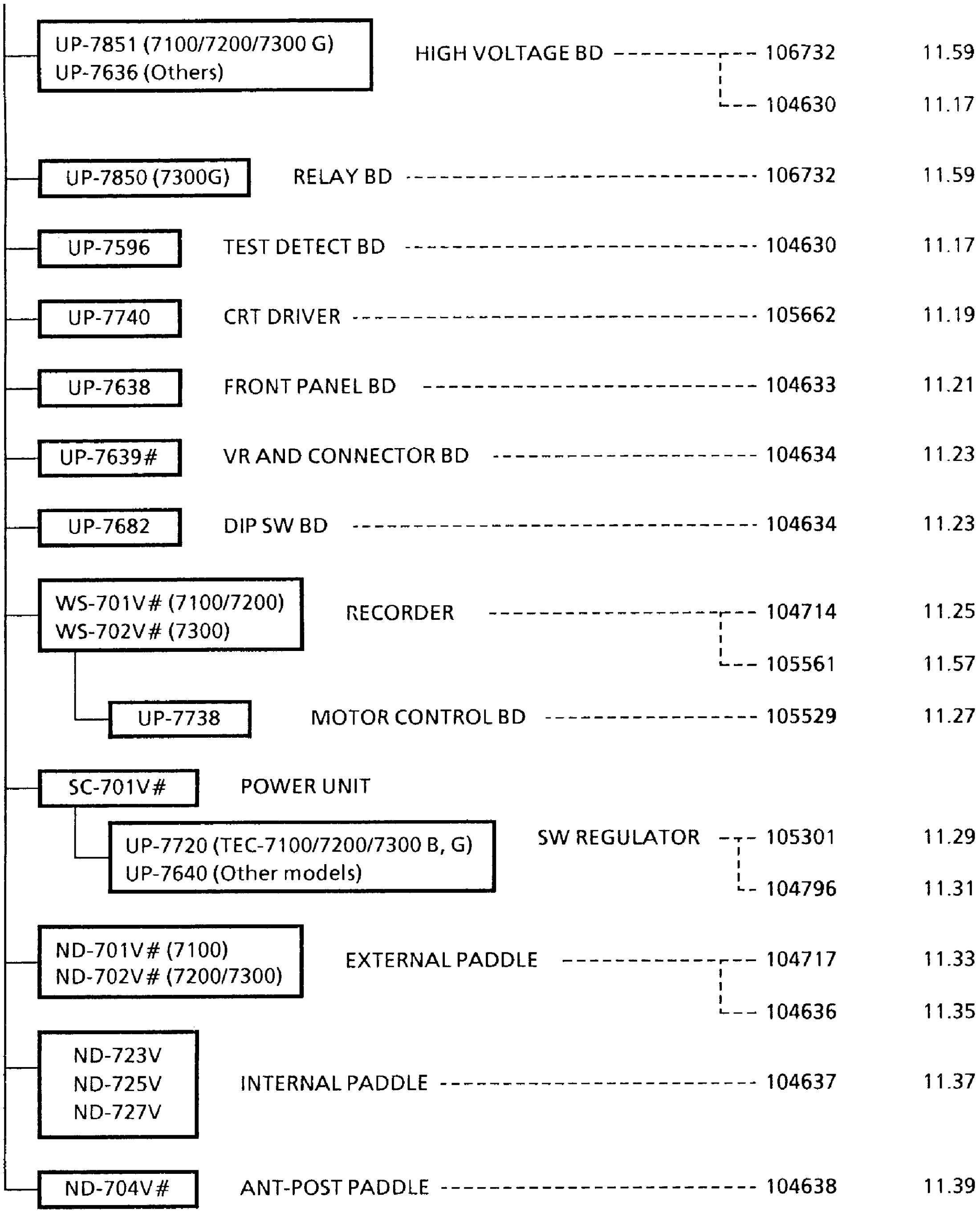
TEC-7100
TEC-7200
TEC-7300

UP-76351 (7100)
UP-7635 (7200)
ECG / CPU BD

ECG / CPU (1 / 5) MAIN ------------------ 104628 11.7
ECG / CPU (2 / 5) ECG 2 ------------------ 104627 11.9
ECG / CPU (3 / 5) ECG 1 ------------------ 104626 11.11
ECG / CPU (4 / 5) CRT ------------------- 104629 11.13
ECG / CPU (5 / 5) CONNECTOR ------------- 104640 11.15

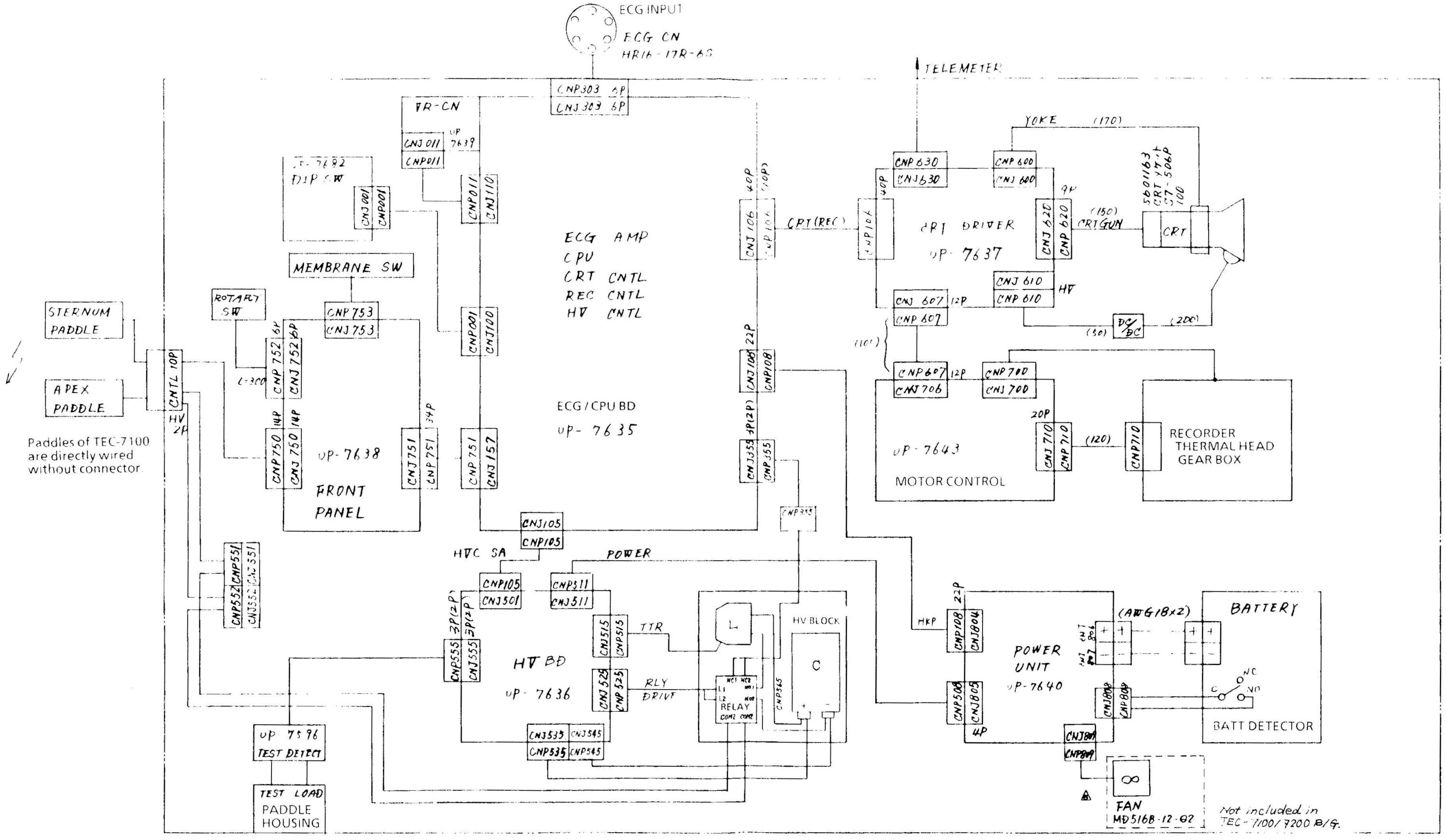
UP-7737 (7300) ECG / CPU BD

ECG / CPU (1 / 5) MAIN ------------------ 105526 11.47
ECG / CPU (2 / 5) ECG 2 ------------------ 105525 11.49
ECG / CPU (3 / 5) ECG 1 ------------------ 105524 11.51
ECG / CPU (4 / 5) CRT ------------------- 105527 11.53
ECG / CPU (5 / 5) CONNECTOR ------------- 105528 11.55



UP-7851 (7100/7200/7300 G) UP-7636 (Others)	HIGH VOLTAGE BD	106732 104630	11.59 11.17
UP-7850 (7300G)	RELAY BD	106732	11.59
UP-7596	TEST DETECT BD	104630	11.17
UP-7740	CRT DRIVER	105662	11.19
UP-7638	FRONT PANEL BD	104633	11.21
UP-7639#	VR AND CONNECTOR BD	104634	11.23
UP-7682	DIP SW BD	104634	11.23
WS-701V# (7100/7200) WS-702V# (7300)	RECORDER	104714 105561	11.25 11.57
UP-7738	MOTOR CONTROL BD	105529	11.27
SC-701V#	POWER UNIT		
UP-7720 (TEC-7100/7200/7300 B, G) UP-7640 (Other models)	SW REGULATOR	105301 104796	11.29 11.31
ND-701V# (7100) ND-702V# (7200/7300)	EXTERNAL PADDLE	104717 104636	11.33 11.35
ND-723V ND-725V ND-727V	INTERNAL PADDLE	104637	11.37
ND-704V#	ANT-POST PADDLE	104638	11.39

Units with # mark differ according to the model.
See pages 1.7 and 1.8 for units with # mark.


ECG INPUT
ECG CN
HR16-17R-6S
TELEMETER
CNP303 6P
CNJ303 6P
VR-CN
CNJ011
UP 7639
CNP011
UP-7682
DIP SW
CNJ001
CNP001
CNP011
CNJ110
MEMBRANE SW
ROTARY SW
CNP753
CNJ753
STERNUM PADDLE
APEX PADDLE
CNTL 10P
HV 2P
L=300
CNP752 6P
CNJ752 6P
CNP750 14P
CNJ750 14P
UP-7638
FRONT PANEL
CNJ751 34P
CNP751
CNP001
CNJ100
CNP751
CNJ157
ECG AMP
CPU
CRT CNTL
REC CNTL
HV CNTL
ECG/CPU BD
UP-7635
CNJ106 40P
CNP106 (40P)
CNJ108 22P
CNP108
CNJ355 3P(2P)
CNP355
CNJ105
CNP105
CNP355
CRT(REC)
CNP106 40P
CNP630
CNJ630
CNP600
CNJ600
YOKE (170)
CRT DRIVER
UP-7637
CNJ620 9P
CNP620
(150) CRT GUN
5601163 CRT YY+ 57-506P 100
CRT
CNJ610
CNP610
HV
CNJ607 12P
CNP607
DC/DC
(50)
(200)
(101)
CNP607 12P
CNJ706
CNP700
CNJ700
UP-7643
MOTOR CONTROL
CNJ710 20P
CNP710
(120)
CNP710
RECORDER
THERMAL HEAD
GEAR BOX
CNP551
CNJ551
CNP552
CNJ552
HVC SA
CNP105
CNJ501
POWER
CNP511
CNJ511
CNP555 3P(2P)
CNJ555 3P(2P)
CNJ515
CNP515
TTR
CNJ525
CNP525
RLY DRIVE
HV BD
UP-7636
CNJ535
CNP535
CNJ545
CNP545
HV BLOCK
L
C
NC1 NC2
NO1
L1
L2
NO2
RELAY
COM1 COM2
CNP565
UP-7596
TEST DETECT
TEST LOAD
PADDLE HOUSING
HKP
CNP108 22P
CNJ804
CNP508
CNJ805 4P
POWER UNIT
UP-7640
(AWG18×2)
BATTERY
NC
C
NO
CNJ808
CNP808
BATT DETECTOR
CNJ809
CNP809
FAN
MD516B-12-02

Paddles of TEC-7100 are directly wired without connector.

Not included in TEC-7100/7200 B/G.

B 2		62 1 21	APPD	DWG NO 104783B
A 2		61 11 4	CHK 2	MODEL TEC-7100 TEC-7200
REVIS	REASON	DATE	CHK 1 / DESIGN / TRACE	NAME BOARD CONNECTION

6

添付図

所属図

NIHON KOHDEN

CNJ 057 (CHASSIS)

to CNJ 750 (FRONT PANEL)
HKP-14MS-7BT

	1	—	1	$\overline{\text{EX-CHG}}$
	2	—	2	PADL 2
	3	—	3	PADL 1
フロントパネル	4	—	4	CHG-LED
to CNJ750	5	—	5	ED
	7	—	6	$\overline{\text{EX-DISCHG}}$
	8	—	7	LED-GR
	9	—	8	LED-YEL
	10	—	9	LED-RED
HV		—	10	SHIELD

CNJ 100 (CPU)
M60-12-30-114P
to CNJ 001 (DIPSW)
M60-12-30-114P

	—	1	DIP-0
	—	2	DIP-1
	—	3	DIP-2
	—	4	DIP-3
	—	5	DIP-4
	—	6	DIP-5
	—	7	DIP-6
	—	8	DIP-7
	—	9	E_D
	—	10	ZBECG+
	—	11	EA
	—	12	

CNJ 105 (CPU)
M60-15-30-114
to CNJ 501 (HV)
M60-15-30-114

		1	CHG ON
		2	INT-RLY
		3	EXT-PLY
		4	$\overline{\text{DCHG CHK}}$
		5	TTRRST
		6	TTR OUT
		7	OVER-CHG
		8	CHG AD
		9	
		10	+8.5V
		11	EA
		12	-8.5V
		13	ENRG ADJ
		14	
		15	

CNJ 106 (CPU)
H4F3A5B 40D A1
to CNJ 601 (CRT, REC)

12V REC	1	2	$\overline{\text{SOUT}}$
E_R	3	4	E_R
-6V	5	6	+5V
+6V	7	8	-8.5V
+8.5V	9	10	12VCRT
$\overline{\text{SIN}}$	11	12	STB
PRT CLK	13	14	$\overline{\text{ENB}}$
REC	15	16	NO PAPER
E_Y	17	18	E_Y
CH1/ $\overline{\text{CH2}}$	19	20	V SYNC
HSYNC	21	22	
BLANK1	23	24	WAVE/ $\overline{\text{CHR}}$
BRIGHT	25	26	Y SIG
INTENS-3	27	28	INTENS-2
INTENS-1	29	30	EA
TELEW	31	32	$\overline{\text{ART}}$
$\overline{\text{RCVFLT}}$	33	34	$\overline{\text{TELE}}$
$\overline{\text{CALL}}$	35	36	$\overline{\text{ZBB}}$
TELE SEL	37	38	+12VB
E_D	39	40	E_D

CNJ 108 (CPU)
HKP 22HS-11BT
to CNJ 804 (POWER)
HKP-22HS-11BT

E_A	1	2	E_A
E_D	3	4	E_D
E_R	5	6	E_R
E_Y	7	8	E_Y
-6V	9	10	+5V
+6V	11	12	-8.5V
+8.5V	13	14	+12VCRT
BAT CHG	15	16	+12VREC
AC	17	18	BATT OFF
POWER ON	19	20	+12VB
	21		

CNJ 110 (CPU)
M60-12-30-114
to CNJ011 (VR CONNECTOR BD)
M60-12-30-114

		1	INTENS-1	
		2	INTENS-2	
		3	INTENS-3	
		4	BELL IN	
		5	BELL ADJ	
		6	~~EX SYNC~~	△1
		7	AUX	
		8	EXT ECG	
		9	EA	
		10	~~EXTOT~~	△A
		11	~~MRKPLS~~	△1
		12		

6

△×				承認 APPD		DWG NO 104711A
△×				検図 2 CHK 2		MODEL TEC-7100 TEC-7200
△×				検図 1 CHK 1	小田	NAME CONNECTOR PIN ASSIGN-MENT (1/3)
△×				設計 DESIGN	小田	
△×				写図 TRACE	斎藤	
△×						
△A× 3	31	62 / 29				
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK			

CNJ 157 (CPU)
HiF3FB-34PA-2.54DS
to CNP751 (FRONT PANEL)
HiF2.3A-34D-BC(10)

So	1	2	S1
S2	3	4	S3
RO	5	6	R1
R2	7	8	R3
ESEL 0	9	10	ESEL-1
ESEL-2	11	12	ESEL-3
DISP-0	13	14	DISP-1
DISP-2	15	16	$\overline{\text{EX-CHG}}$
$\overline{\text{EX-DISCHG}}$	17	18	LED-RED
LED-YEL	19	20	LED-GR
CHG-LED	21	22	PADL 1
PADL 2	23	24	BELL OUT
$\overline{\text{CNTL}}$	25	26	BATTCHG
ED	27	28	+5V
ED	29	30	+5V
POWER IN	31	32	+12VB
—	33	34	—

CNJ 303 (ECG AMP)
M60-15-30-114
to CNJ 003 (ECG CONNECTOR)
HR16-17R-6S

		1	RA (R)
		2	—
		3	—
		4	LA (L)
		5	—
		6	—
		7	LL (F)
		8	—
		9	—
		10	RL (RF)
		11	—
		12	—
		13	V (C)
		14	—
		15	SHIELD

CNJ511 ([illegible])
350543-1 (AMP)
to CNJ 805 (POWER)
350543-1 (AMP)

		1	+12VCHG
		2	+12VCHG
		3	ECHG
		4	ECHG

CNJ 355 (ECG AMP)
M60-3-30-114
to CNJ 553 (HV UNIT)
M60-3-30-114

		1	P-ECG S
		2	—
		3	P-ECG A

CNJ 600 (CRT)
HKF-[illegible]0M5S-1T
to YOKE

		1	X1
		2	X2
		3	Y1
		4	Y2
		5	YF2
		6	YF1

CNJ 607 (CRT)
M60-12-30-114
to CNJ 706 (REC)
M60-12-30-114

		1	ER
		2	ER
		3	+12VREC
		4	$\overline{\text{SIN}}$
		5	STB
		6	PRT CLK
		7	$\overline{\text{ENB}}$
		8	+5V
		9	REC
		10	NOPAPER
		11	EL
		12	$\overline{\text{SOUT}}$

CNJ 620 (CRT)
M60-9-30-114
to CRT NECK
S7-506P-100

		1	G1
		2	K
		3	H
		4	H
		5	
		6	G2
		7	G4

CNJ 8[illegible]8 (POWER)
171825-2
to BATTERY

		1	LED+
		2	LED−

CNJ 80[illegible] (POWER
170267-1
to BATTERY

		1	BAT-+

CNJ 50[illegible] [illegible] R)
170267-1
to BATTERY

		1	BAT −

承認 APPD		DWG NO 104712
検図 2 CHK 2		MODEL TEC-7100 TEC-7200
検図 1 CHK 1	小林	NAME CONNECTOR PIN ASSIGN-
設計 DESIGN	小林	

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CNJ 630 (CRT)
M60-15-30-134
to TELEMETER

	1	2	
+5V	3	4	-6V
+6V	5	6	ED
EA	7	8	+12VB
TELE SEL	9	10	ZBB
CALL	11	12	TELE
RCVFLT	13	14	ART
TELER	15		

CNJ 700 (REC)
M60-11-30-114
to RECORDER

		1	SENS-A
		2	SENS K
		3	SENS-E
		4	SENS C
		5	LUR-COM
		6	LUR-N.O
		7	SENS-—
		8	SENS-+
		9	SENS-OUT
		10	MOTOR1
		11	MOTOR2
		12	FEED-A
		13	FEED-K
		14	FEED-C
		15	FEED-E

CNJ 710 (REC)
HKP-20MS10BT
to (THERMAL HEAD)

ER	1	2	ER
ER	3	4	ER
STB	5	6	ER
ED	7	8	CLK
+9V	9	10	SIN
+9V	11	12	+9V
	13	14	+9V
	15	16	
SOUT	17	18	ENB
+5V	19	20	

CNJ 750 (FRONT PANEL)
HKP-14MS-9BT
to CNJ 059 (PADDLE CONNECTOR)

EX-CHG	1	2	PADL 2
PADL 1	3	4	CHG-LED
ED	5	6	EX-DISCHG-A
EX-DISCHG	7	8	LED-GR
LED-YEL	9	10	LED-RED
ED	11	12	EX-DISCHG-S
—	13	14	—

Paddles of TEC-7100
are directly wired.

CNJ 752 (ENERGY SELECTOR)
[illegible]

E SEL 0	1	2	E SEL 1
E SEL 2	3	4	E SEL 3
ED	5	6	POWER ON

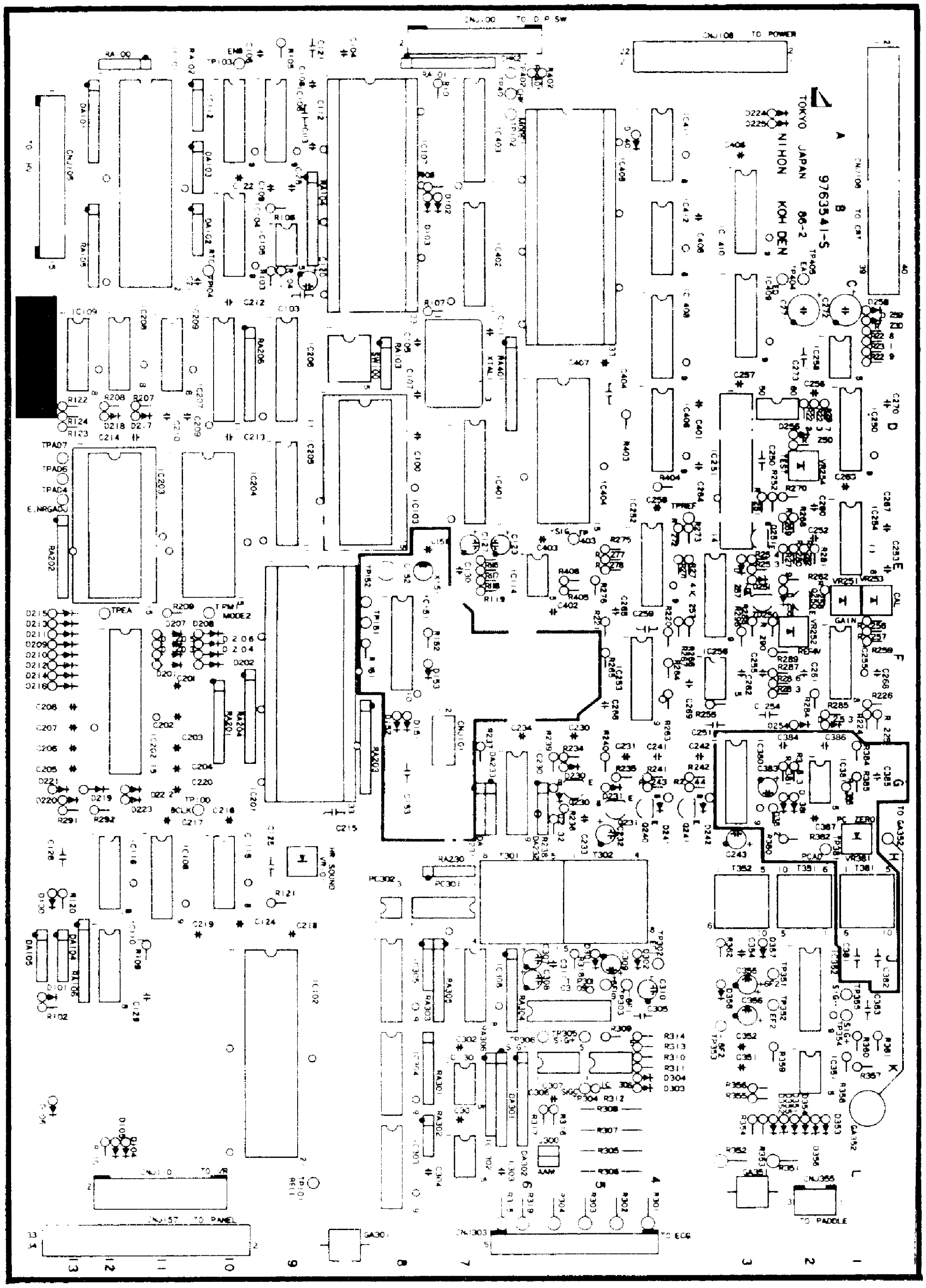
NIHON KOHDEN

変更 REVIS	理由 REASON	年月日 DATE	検図 CHK	

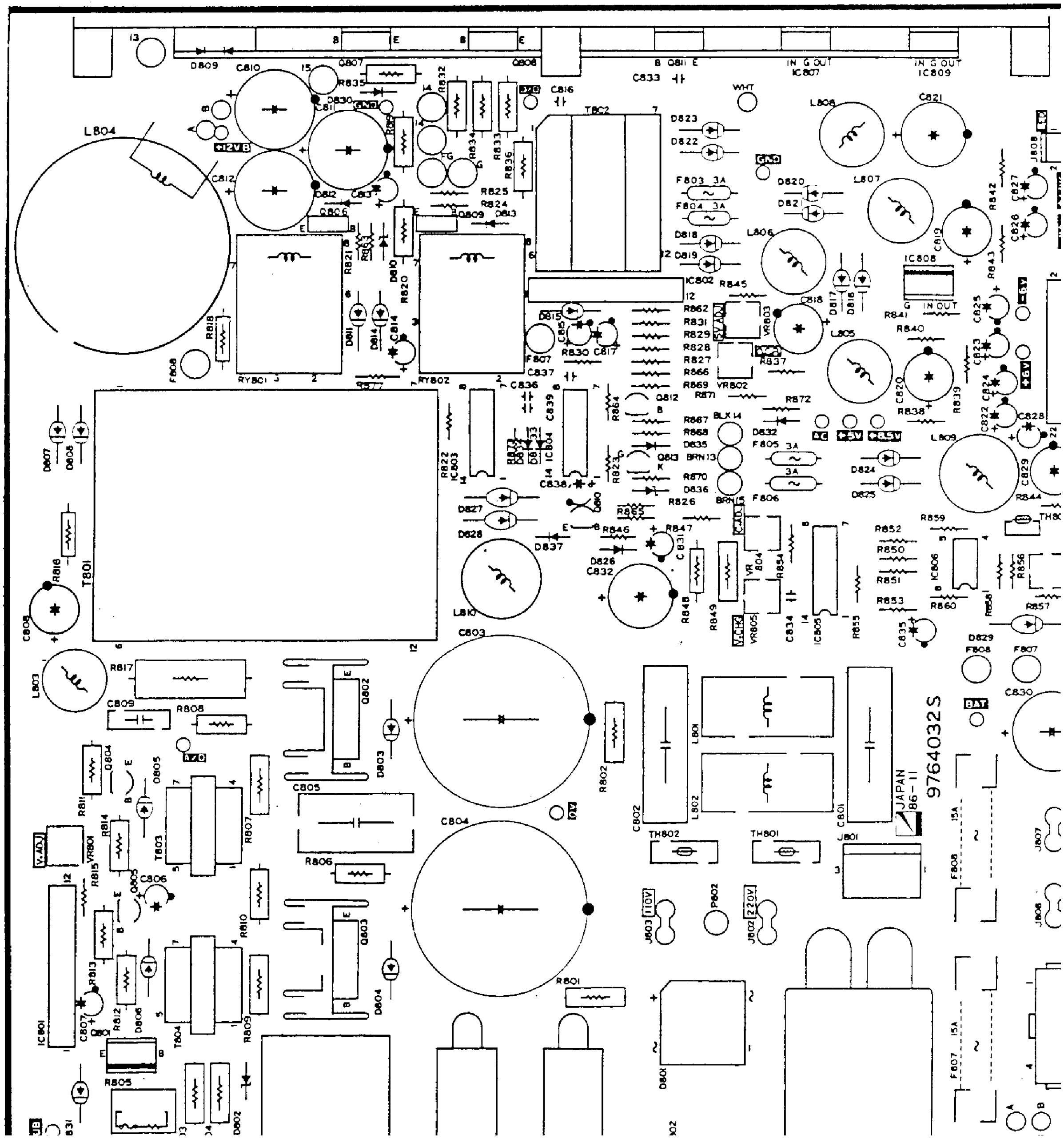
承認 APPD
検図2 CHK 2
検図1 CHK 1
設計 DESIGN
写図 TRACE

DWG NO 104713
MODEL TEC-7100
TEC-7200
NAME CONNECTOR PIN ASSIGNMENT (3/3)

ECG / CPU BD
UP-76351
UP-7635

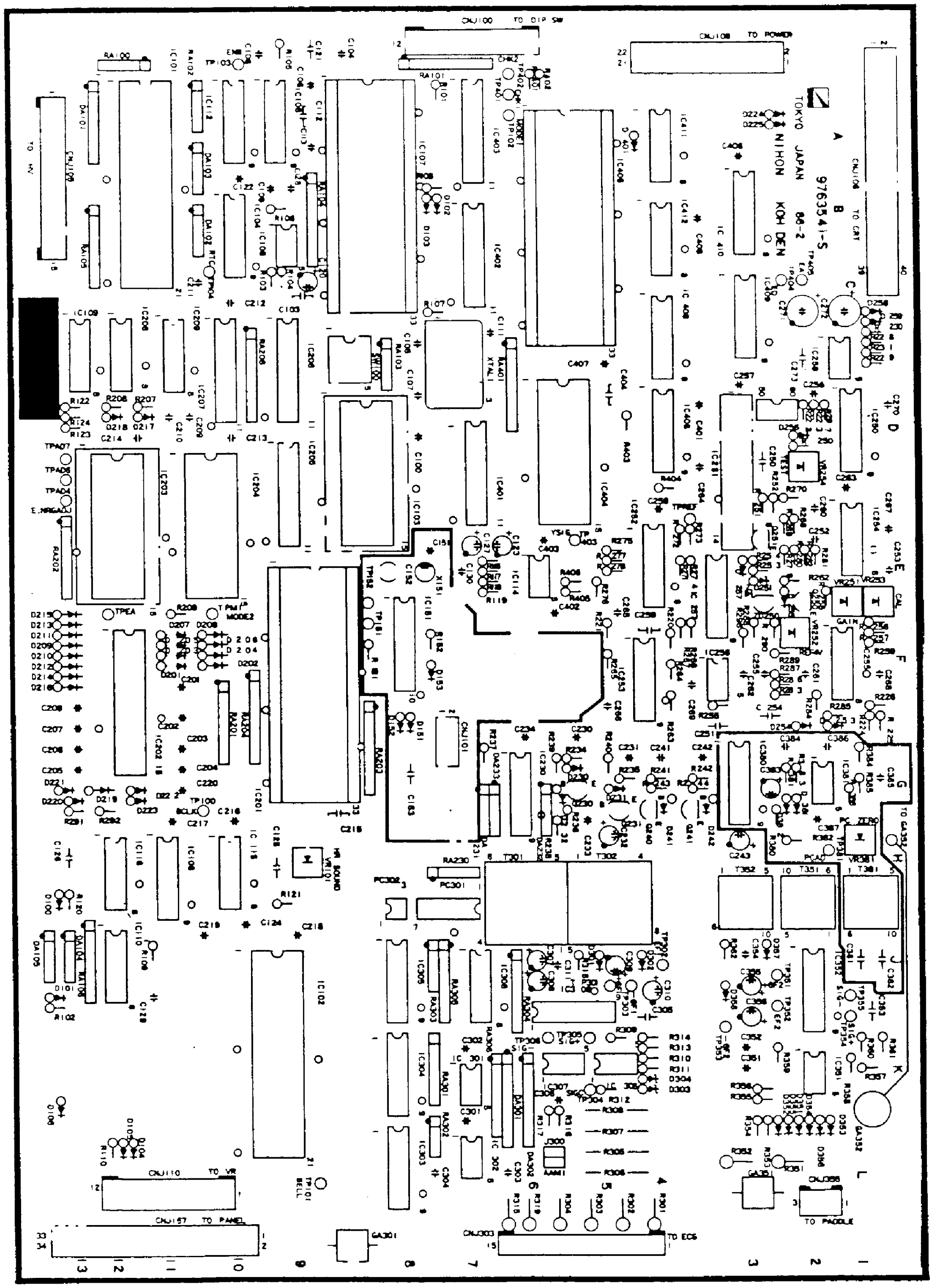

CNJ100 TO D.P. SW
CNJ108 TO POWER
CNJ106 TO CRT
CNJ105 TO HV
TOKYO JAPAN
NIHON KOH DEN
9763541-S
86-2
A
B
C
D
E
F
G
H
J
K
L
HR SOUND
GAIN
CAL
PC ZERO
TO GA352
CNJ110 TO VR
CNJ157 TO PANEL
CNJ303 TO ECG
CNJ355 TO PADDLE
GA301
GA351
GA352
1
2
3
7
8
9
10
11
12
13

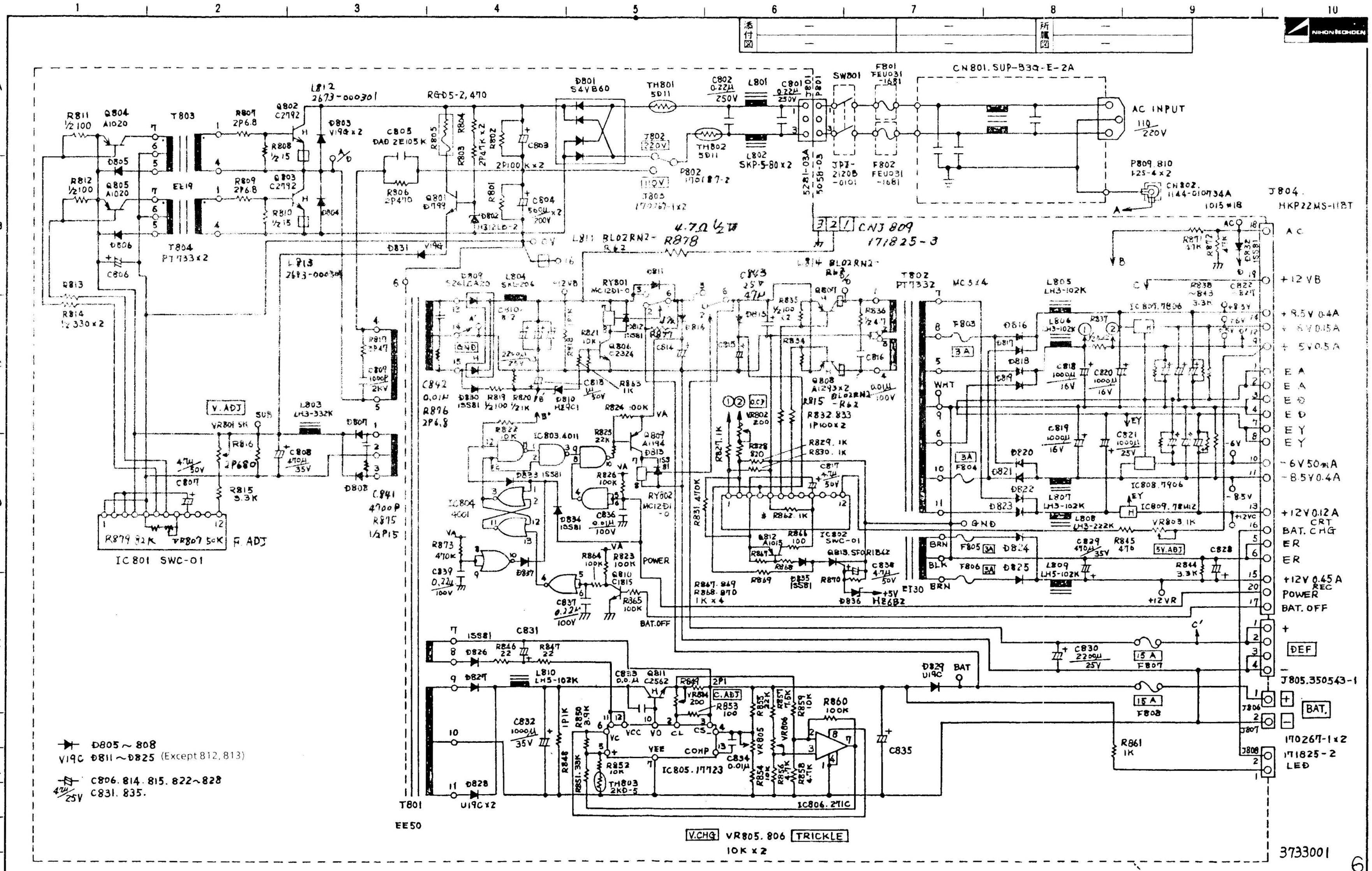
SW REGULATOR
UP-7640



L804
L803
L810
L805
L806
L807
L808
L809
L801
L802
T801
T802
T803
T804
RY801
RY802
IC801
IC802
IC803
IC804
IC805
IC806
IC807
IC808
IC809
C803
C804
C805
C801
C802
C806
C807
C808
C809
C810
C811
C812
C821
C830
Q801
Q802
Q803
Q804
Q805
Q806
Q807
Q808
Q811
Q812
Q813
D801
D803
D804
D807
D808
D809
TH801
TH802
J801
J802
J803
P802
110V
220V
F803 3A
F804 3A
F805
F806
F807
F808
15A
VR801
VR802
VR803
VR804
VR805
V.ADJ
5V ADJ
+12VB
-5V
+5V
+6V
+8.5V
A/D
BAT
WHT
BLK
BRN
JAPAN
86-11
97640325

CG / CPU BD
JP-76351
JP-7635

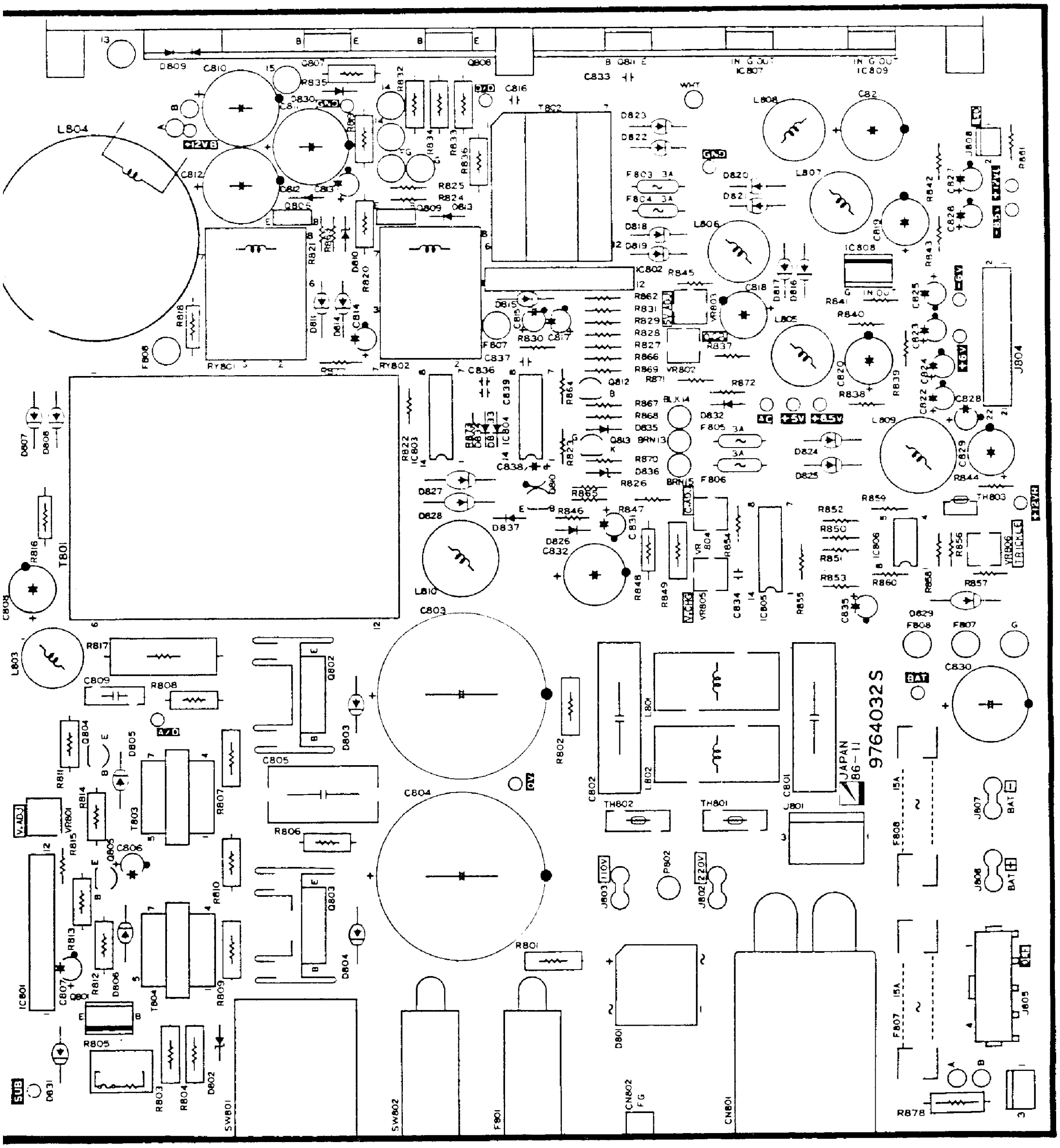

CNJ100 TO DIP SW
CNJ108 TO POWER
TOKYO JAPAN
NIHON KOH DEN
9763541-S
86-2
A
B
C
D
E
F
G
H
J
K
L
CNJ104 TO CRT
CNJ109 TO HV
CNJ110 TO VR
CNJ157 TO PANEL
CNJ303 TO ECG
CNJ355 TO PADDLE
GA301
GA351
GA352
T301
T302
T351
T352
T361
IC102
IC201
IC203
IC204
XTAL1
GAIN
CAL
ZERO
HR SOUND
BELL
13
12
11
10
9
8
7
3
2
1

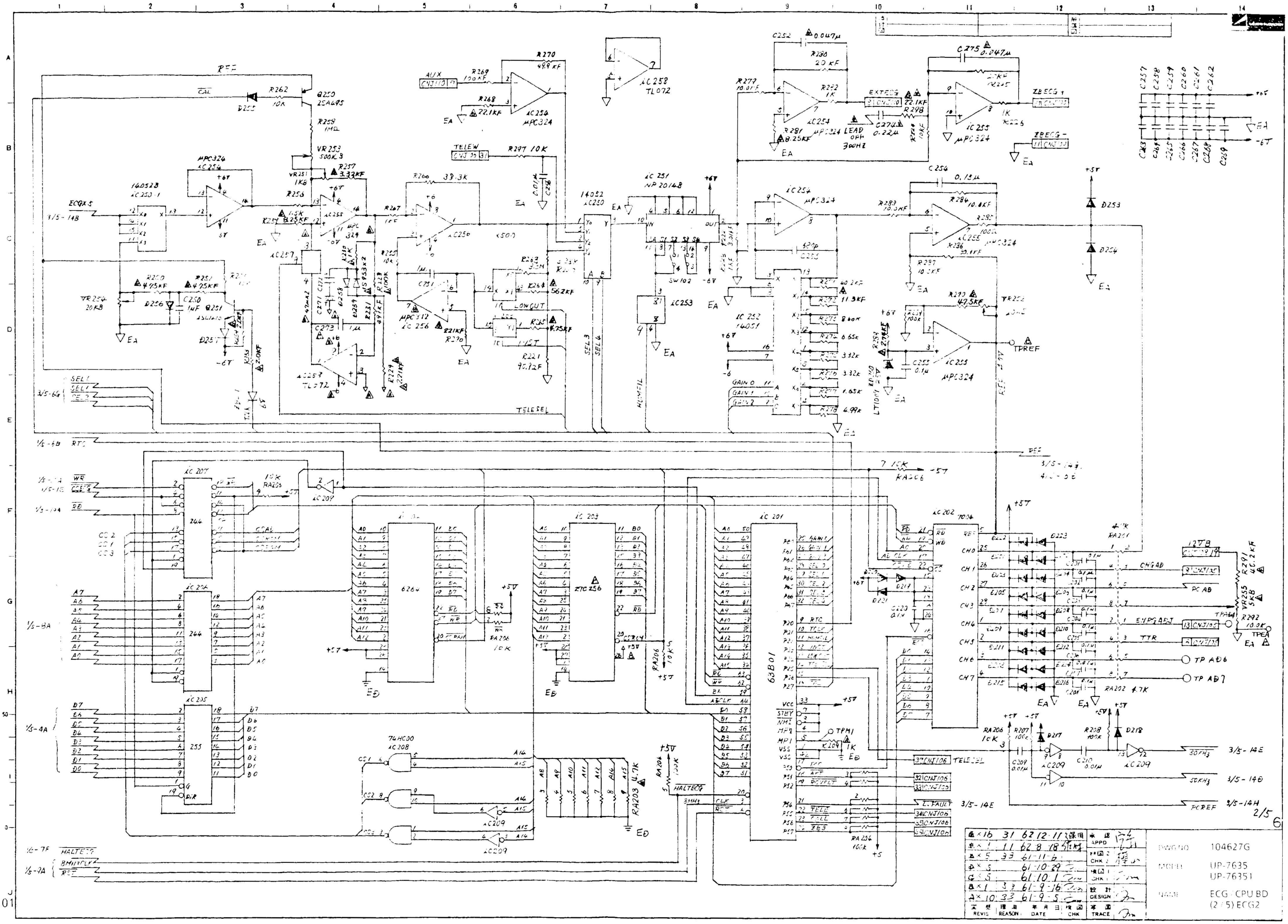


1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
F
G
50
NIHON KOHDEN
CN801. SUP-B3Q-E-2A
AC INPUT
110/220V
SW801
F801 FEU031-1681
F802 FEU031-1681
JP3-2120B-0101
D801 S4VB60
TH801 5D11
TH802 5D11
C802 0.22μ 250V
L801
L802 SKP-5-80×2
C801 0.22μ 250V
5281-03A 5058-03
J802 220V
J803 110V
P802 170187-2
P809.810 125-4×2
CN802. 1144-010734A 1015#18
J804. HKP22MS-11BT
CN J 809 171825-3
R811 1/2 100
Q804 A1020
T803
R812 1/2 100
Q805 A1020
EE19
T804 PT733×2
R807 2P6.8
R809 2P6.8
Q802 C2792
Q803 C2792
R808 1/2 15
R810 1/2 15
L812 2673-000301
D803 V19G×2
C805 DAO 2E105K
R806 2P470
Q801 D799
RGD5-2, 470
2P100K×2
C803
C804 560μ×2 200V
D802 13121D-2
L813 2673-000301
R813
R814 1/2 330×2
D806
C806
D831
L811 BL02RN2-R62
4.7Ω 1/2W R878
R817 2P47
C809 1000P 2KV
V. ADJ
VR801 5K
SUB
L803 LH3-332K
R816 2P680
C807 47μ 50V
R815 3.3K
C808 470μ 35V
D807
D808
C841 4700P
R875 1/2P15
IC801 SWC-01
R879 8.2K
VR807 50K
F. ADJ
D809 S2K1A20
L804 SKL-204
RY801 MC12D1-0
C842 0.01μ
R876 2P6.8
D830 1SS81
R819 1/2 100
R820 1/2 1K
D810 HZ9C1
Q806 C2324
R821 10K
R863 1K
C815 50V
R824 100K
IC803 4011
R822 10K
R825 22K
Q807 A1194
D813
D833 1SS81
R826 100K
D834 1SS81
C836 0.01μ 100V
IC804 4001
RY802 MC12D1-0
R873 470K
C839 0.22μ 100V
D837
R864 100K
R823 100K
Q810 C1815
R865 100K
C837 0.22μ 100V
POWER
BAT.OFF
L814 BL02RN2-R62
C843 25V 47μ
R835 1/2 100×2
Q809
R836 1/2 47
Q808 A1243×2
R815 BL02RN2-R62
0.01μ 100V
R832.833 1P100×2
VR802 200
R828 820
R829. 1K
R830. 1K
C817 47μ 50V
R831 470K
R862 1K
IC802 SWC-01
Q812 A1015
R866 100
R867
R868
R869
Q813. SFOR1B42
D835 1SS81
R870
C838 47μ 50V
D836 HZ6B2
+5V
R867~869 R868~870 1K×4
T802 PT7332
MC3/4
F803 3A
F804 3A
WHT
GND
BRN
BLK
F805 3A
F806 3A
ET30
D814
D825
L805 LH3-102K
L806 LH3-102K
L807 LH3-102K
L808 LH3-222K
L809 LH5-102K
D816
D817
D818
D819
D820
D821
D822
D823
C818 1000μ 16V
C820 1000μ 16V
C819 1000μ 16V
C821 1000μ 25V
IC807. 7806
IC808. 7906
IC809. 78M12
R837
R838~843 3.3K
C822 82P
R871 47K
R872 4.7K
D832 1SS81
D839
C829 470μ 35V
R845 470
5V.ADJ
VR803 1K
R844 3.3K
C828
+12VB
+12VR
+8.5V
+7.6V
-6V
-8.5V
+12VC
AC
+12 VB
+8.5V 0.4A
+6V 0.15A
+5V 0.5A
EA
EA
ED
ED
EY
EY
-6V 50mA
-8.5V 0.4A
+12V 0.12A
CRT BAT. CHG
ER
ER
+12V 0.45A REC
POWER
BAT. OFF
DEF
J805. 350543-1
BAT.
J806
J807
J808
170267-1×2
171825-2 LED
C830 2200μ 25V
15A F807
15A F808
D829 V19C
BAT
R861 1K
1SS81
C831
R846 22
R847 22
D826
D827
D828 V19C×2
L810 LH5-102K
C832 1000μ 35V
1P1K
R850 3.9K
R848
R851 33K
TH803 2KD-5
R852 10K
C833 0.01μ
Q811 C2562
R849
VR804 200
2P1
C. ADJ
R853 100
IC805. 17723
VCC
VO
CL
CS
VC
VEE
COMP
C834 0.01μ
R855
R857
R859 10K
VR805
VR806
R854
R856
R858 4.7K
R860 100K
IC806. 271C
C835
T801
EE50
V.CHG
VR805. 806
TRICKLE
10K×2
D805~808
V19C D811~D825 (Except 812, 813)
C806. 814. 815. 822~828
47μ/25V C831. 835.
3733001
6

△×		- -		承認 APPD		DWG NO	105301A
△×		- -		検図 2 CHK 2	下井		
△×		- -				MODEL	UP-7720
△×		- -		検図 1 CHK 1	工藤		
△×		- -				NAME	SW REGULATOR
△×		- -		設計 DESIGN	浜中		
▲×4	11	61-12-16	工藤				
変更 REVIS	理由 REASON	年 月 日 DATE	検図 CHK	写図 TRACE	西川		

SW REGULATOR
UP-7640


D809
C810
Q807
R835
Q808
C833
Q811
IC807
IC809
C816
T802
D823
D822
C82
L808
J808
R861
L804
C812
D812
C813
Q805
Q809
D813
R825
R824
R836
R834
R833
R832
F803 3A
F804 3A
D820
D821
L807
R842
C827
C826
C819
R843
D818
D819
IC802
L806
D817
D816
IC808
R845
C818
VR801
R841
C825
R840
R821
R820
D810
D811
D814
C814
RY801
RY802
R818
F808
D815
C815
R830
C817
F807
C837
R862
R831
R829
R828
R827
R866
R869
R871
VR802
R837
L805
C820
R839
C823
C824
R838
C822
C828
J804
C836
C839
R864
Q812
R867
R868
D835
BLK14
BRN13
BRN15
D832
F805 3A
F806
D824
D825
C829
L809
R844
TH803
R822
IC803
R873
D833
IC804
R823
Q813
R870
D836
R826
D827
D828
C838
D830
R865
R846
R847
D837
D826
C832
C831
R848
R849
VR804
R854
VR805
C834
IC805
R855
R852
R850
R851
R853
R859
IC806
R856
VR806
R857
R858
R860
C835
D829
L810
C808
R816
T801
L803
R817
C809
R808
C803
Q802
D803
R802
C802
L801
L802
C801
9764032S
JAPAN 86-11
C830
Q804
D805
R811
R814
T803
R807
VR801
R815
Q806
C806
C805
C804
R806
TH802
TH801
J801
F808 15A
J807
BAT
J806
J803 110V
P802
J802 220V
IC801
R813
R812
D806
C807
Q801
T804
R810
R809
Q803
D804
R801
D801
CN801
F807 15A
J805
R805
D831
R803
R804
D802
SW801
SW802
F801
CN802 FG
R878
+12VB
GND
+5V
+6.5V
AC
+12VH
V-ADJ
A/D
OV
SUB



IC250-1 14052B
IC254 μPC324
IC255 μPC324
IC256 μPC312
IC257 TL072
IC258 TL072
IC250 14052
IC251 NP2014B
IC253
IC252 14051
Q250 2SA495
Q251 2SC1815
VR253 500KB
VR254 20KB
VR251 1KB
ECGX5
3/5-14B
REF
CAL
AUX
TELEW
EXTECG
LEAD OFF 300Hz
ZBECG+
ZBECG−
TPREF
SEL1
SEL2
SEL3
SEL4
TELESEL
HUMFIL
GAIN0
GAIN1
GAIN2
SW102
LOWCUT
HICUT
RTC
REF 3/5-14J
IC207 244
IC206 244
IC205 245
IC204 6264
IC203 27C256
IC201 63B01
IC202 7004
IC208 74HC00
IC209
WR
CSEN
RD
A7 A6 A5 A4 A3 A2 A1 A0
D7 D6 D5 D4 D3 D2 D1 D0
1/5-8A
1/5-4A
1/5-7F
1/5-7A
HALTECG
8MHz CLK
RST
CH0 CH1 CH2 CH3 CH4 CH5 CH6 CH7
CHGAD
PC AD
EXPS ADJ
TTR
TP AD6
TP AD7
TPEA
TPM1
12VB
RA201 4.7K
RA202 4.7K
RA203 4.7K
RA206 10K
D223
D253
D254
D217
D218
50Hz 3/5-14E
50KHz 3/5-14G
PCREF 3/5-14H
E.FAULT 3/5-14E
TELE SEL
+5V
+6V
−6V
EA
ED
2/5
6

変更 REVIS	理由 REASON	年月日 DATE	検図 CHK
圧×16	31	62.12.11	久保田
圧×1	11	62.8.18	糸林
△×5	33	61-11-6	
△×5		61-10-29	
G×5		61.10.1	
B×1	33	61-9-16	
A×10	33	61-9-5	

承認 APPD	
検図2 CHK 2	
検図1 CHK 1	
設計 DESIGN	
写図 TRACE	

DWG NO 104627G

MODEL UP-7635
UP-76351

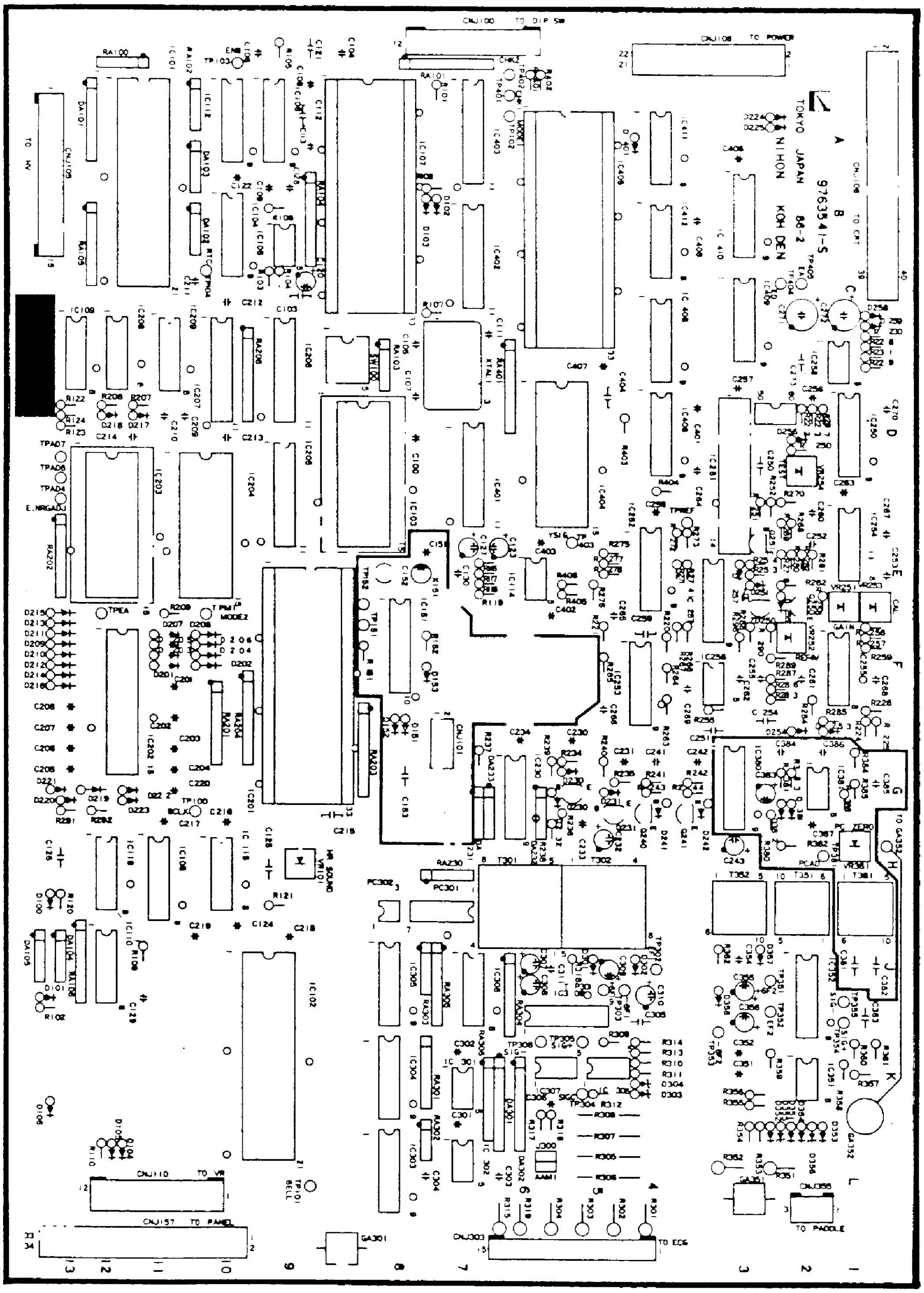
NAME ECG / CPU BD
(2 / 5) ECG2

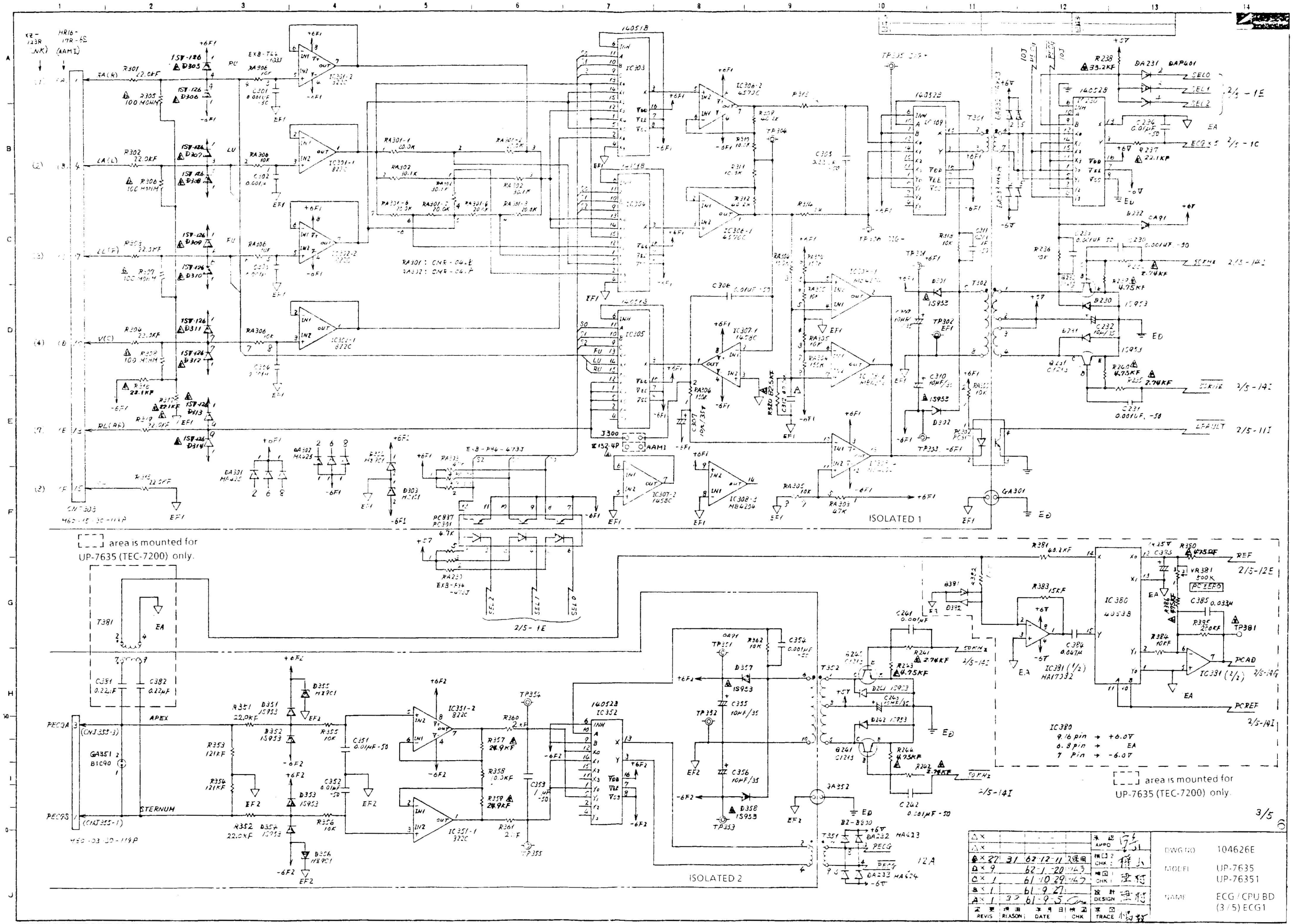
C7100/7200/7300.01

ECG / CPU BD

JP-76351

JP-7635

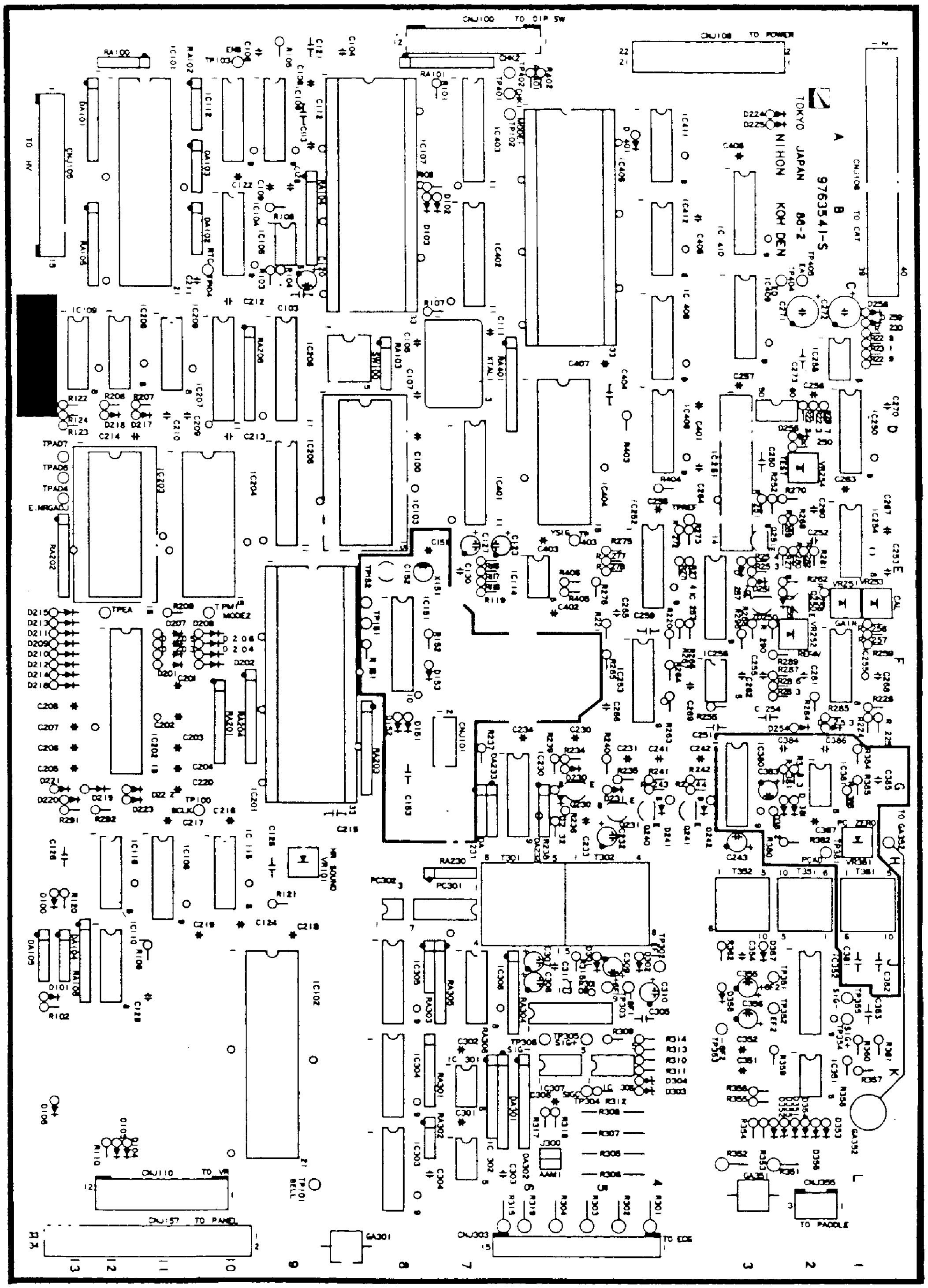

CNJ100 TO DIP SW
CNJ108 TO POWER
TOKYO JAPAN
NIHON KOHDEN
9763541-S
CNJ106 TO CRT
TO HV
CNJ110 TO VR
CNJ157 TO PANEL
CNJ303 TO ECG
TO PADDLE

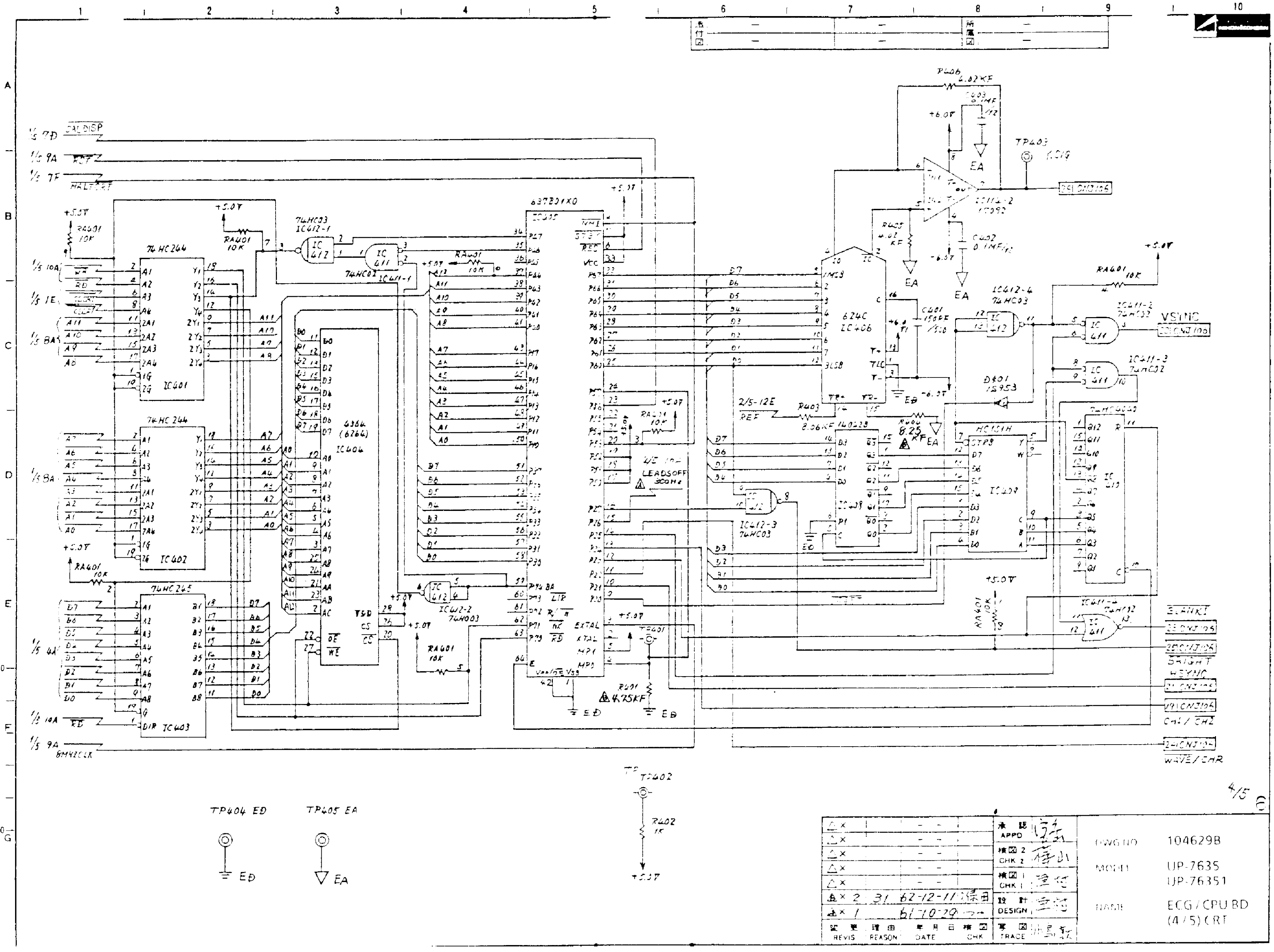


area is mounted for UP-7635 (TEC-7200) only.
ISOLATED 1
ISOLATED 2
IC305
IC303
IC304
IC380 4053B
IC391 (1/2) HA17332
IC352 14052B
IC351-1 822C
IC351-2 822C
IC308-1 4570C
IC308-2 4570C
IC307-1 1458C
IC307-2 1458C
APEX
STERNUM
PECGA
PECGS
T381
T301
T302
T351
T352
GA301
GA351 B1C90
GA352
SEL0
SEL1
SEL2
2/5-1E
2/5-1C
ECG×5
EA
ED
EF1
EF2
REF
2/5-12E
PCAD
2/5-14G
PCREF
2/5-14I
50KHz
2/5-14I
FAULT
2/5-11I
IC380
9,16 pin → +6.0V
6,8 pin → EA
7 pin → -6.0V
3/5

DWG NO	104626E
MODEL	UP-7635 UP-76351
NAME	ECG/CPU BD (3/5) ECG1

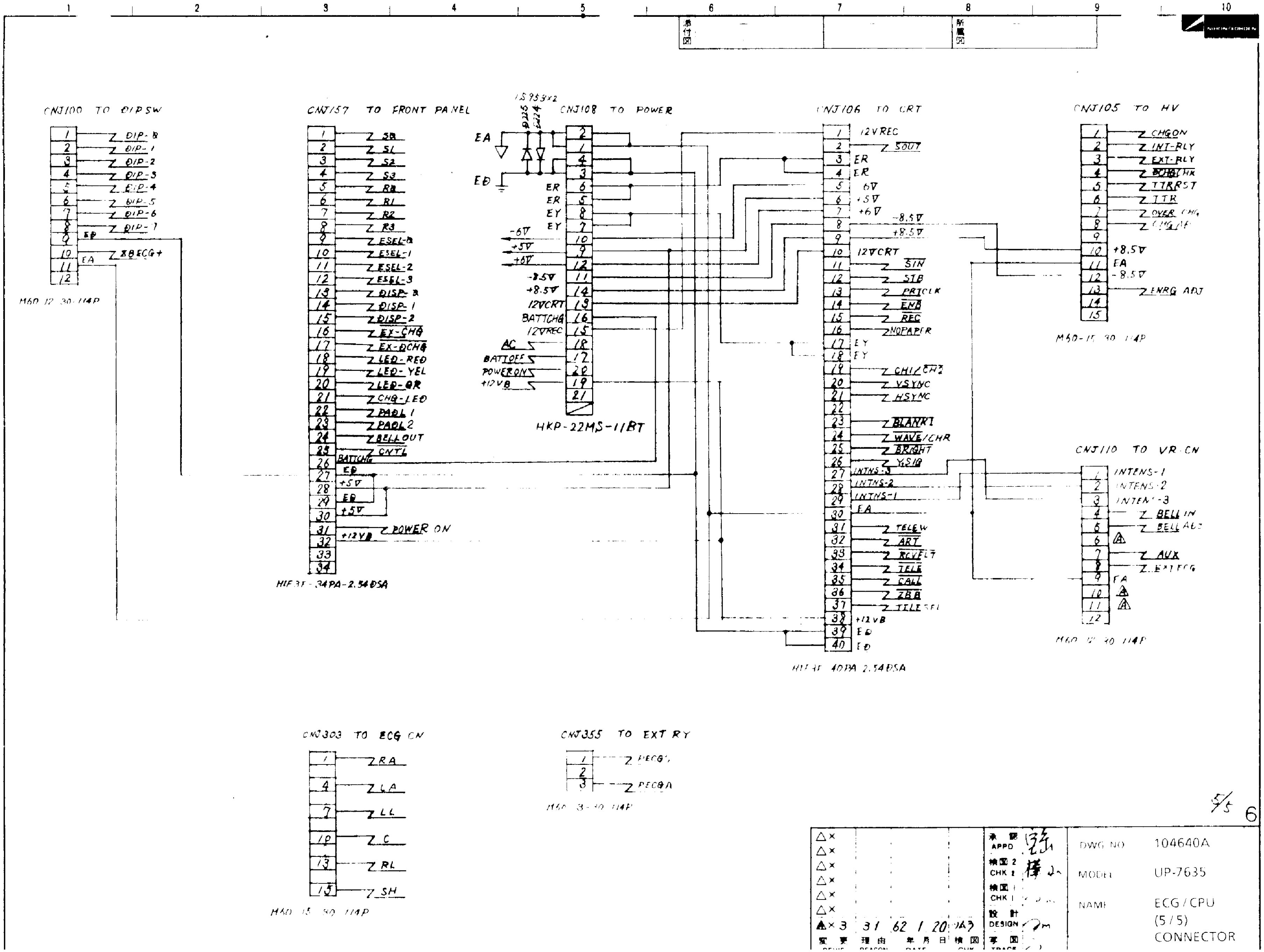
ECG / CPU BD
UP-76351
UP-7635


CNJ100 TO DIP SW
CNJ108 TO POWER
CNJ106 TO CRT
TO HV
CNJ105
TOKYO JAPAN
NIHON KOH DEN
9763541-S
86-2
CNJ110 TO VR
CNJ157 TO PANEL
CNJ303 TO ECG
CNJ355 TO PADDLE
TO GA351
GA301
GA351
GA352
T301
T302
T351
T352
T381
XTAL1
GAIN
CAL
ZERO
MODE2
BCLK
BELL

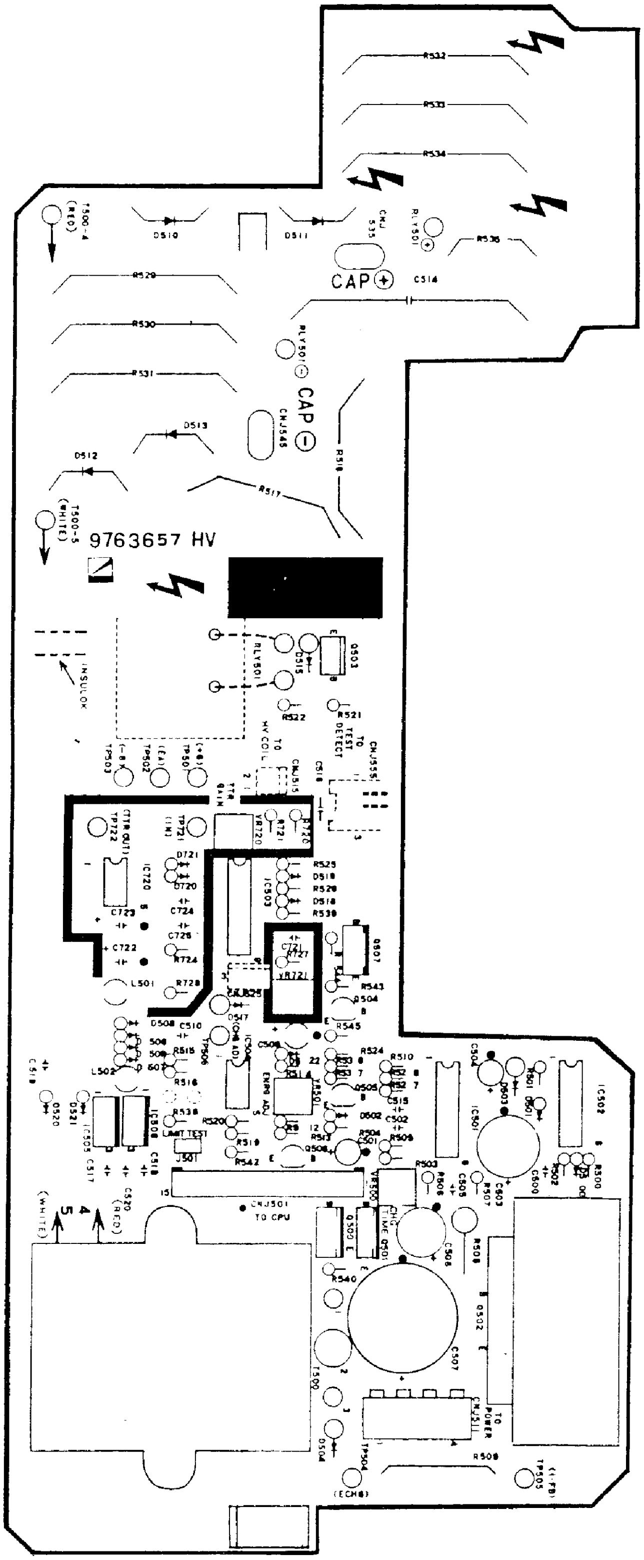

63701X0
IC405
6364 (6264)
IC404
74HC244
IC401
IC402
74HC245
IC403
624C
IC406
HC151H
IC409
IC408
74HC4040
IC410
IC412-1
IC412-2
IC412-3
IC412-4
74HC03
IC411-1
IC411-2
IC411-3
IC411-4
74HC02
74HC32
IC414-2
TL092
TP401
TP402
TP403
TP404 ED
TP405 EA
RA401 10K
R401 4.75KF
R402 1K
R403 8.06KF
R404 8.25KF
R405 4.02KF
R406 6.82KF
C401 150PF
C402 0.1MF
C403 0.1MF
D401 1S953
+5.0V
+6.0V
-6.0V
EA
ED
1/5 7D CALDISP
1/5 9A RST
1/5 7F HALTCRT
1/5 10A WR RD
1/5 1E
1/5 8A
1/5 4A
1/5 10A RD
1/5 9A 8MHZCLK
2/5-12E REF
LE IN-LEADSOFF 300Hz
ECGCN3106
VSYNC
BLANKT
BRIGHT
HSYNC
CH1/CH2
WAVE/CHR

4/5

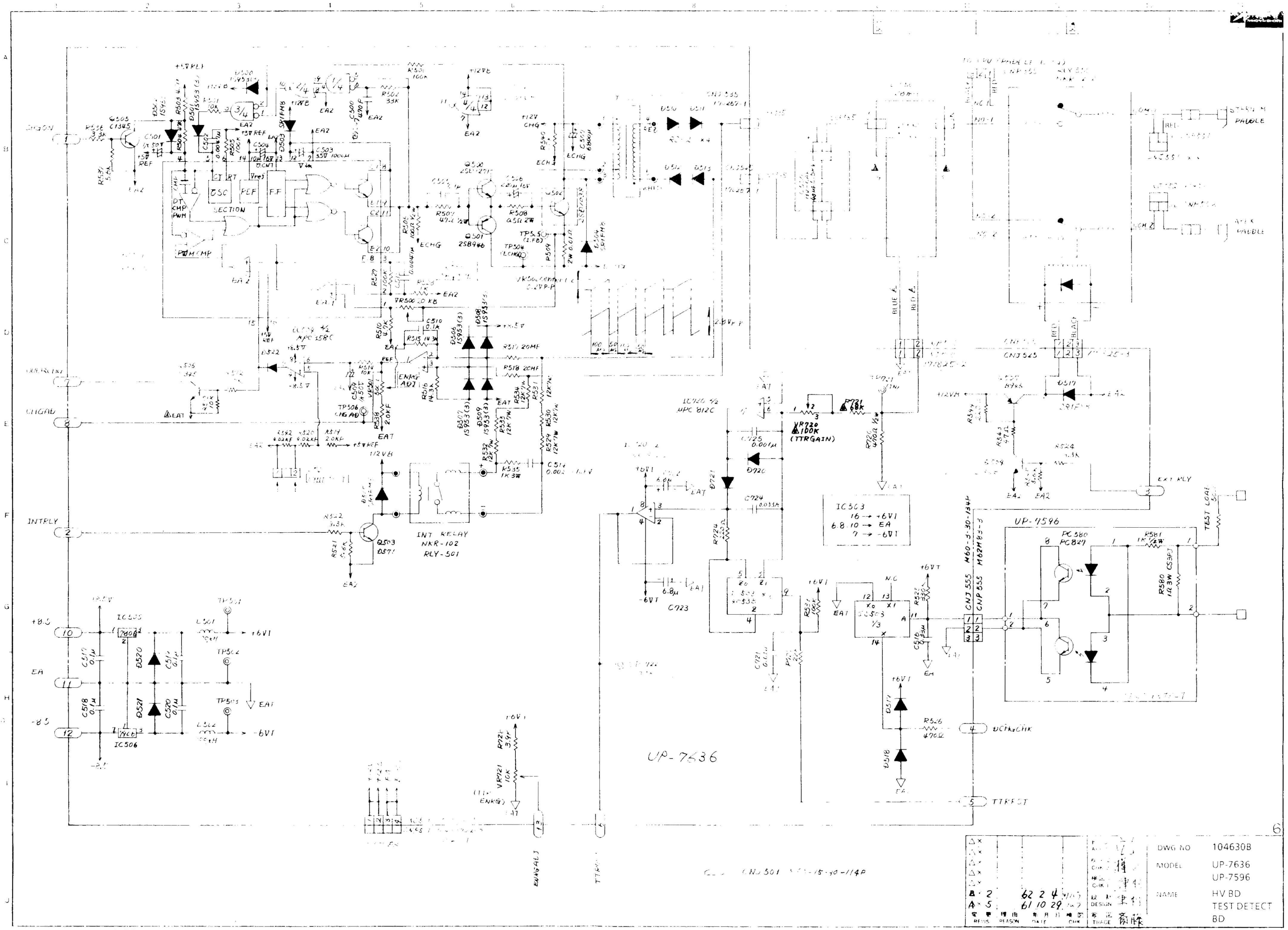
					承認 APPD		DWG NO	104629B
△×		- -			検図 2 CHK 2		MODEL	UP-7635 UP-76351
△×		- -			検図 1 CHK 1			
△×		- -			設計 DESIGN		NAME	ECG / CPU BD (4 / 5) CRT
△×		- -			写図 TRACE			
△× 2	31	62-12-11						
△× 1		61-10-29						
記号 REVIS	理由 REASON	年 月 日 DATE	検図 CHK					


CNJ100 TO DIPSW
DIP-B
DIP-1
DIP-2
DIP-3
DIP-4
DIP-5
DIP-6
DIP-7
EP
EA
XBECG+
M60 12 30 114P
CNJ157 TO FRONT PANEL
SB
S1
S2
S3
RB
R1
R2
R3
ESEL-B
ESEL-1
ESEL-2
ESEL-3
DISP-B
DISP-1
DISP-2
EX-CHG
EX-DCHG
LED-RED
LED-YEL
LED-GR
CHG-LED
PADL 1
PADL 2
BELLOUT
CNTL
BATTCHG
ED
+5V
ED
+5V
+12VB
POWER ON
HIF3F-34PA-2.54DSA
1S953×2
CNJ108 TO POWER
EA
ED
ER
ER
EY
EY
-6V
+5V
+6V
-8.5V
+8.5V
12VCRT
BATTCHG
12VREC
AC
BATTOFF
POWERON
+12VB
HKP-22MS-11BT
CNJ106 TO CRT
12VREC
SOUT
ER
ER
6V
+5V
+6V
-8.5V
+8.5V
12VCRT
SIN
STB
PRTCLK
ENB
REC
NOPAPER
EY
EY
CH1/CH2
VSYNC
HSYNC
BLANK1
WAVE/CHR
BRIGHT
YSIG
INTNS-3
INTNS-2
INTNS-1
EA
TELEW
ART
RCVELT
TELE
CALL
ZBB
TELESEL
+12VB
ED
ED
HIF3F 40PA 2.54DSA
CNJ105 TO HV
CHGON
INT-RLY
EXT-RLY
TTRRST
TTR
OVER CHG
+8.5V
EA
-8.5V
ENRG ADJ
M60-15 30 114P
CNJ110 TO VR CN
INTENS-1
INTENS-2
INTENS-3
BELL IN
BELL ADJ
AUX
EXT ECG
EA
M60 12 30 114P
CNJ303 TO ECG CN
RA
LA
LL
C
RL
SH
M60 15 30 114P
CNJ355 TO EXT RY
RECG
RECGA
M60 3 30 114P
5/5
6
APPD
CHK 2
CHK 1
DESIGN
TRACE
31 62 1 20
DWG NO 104640A
MODEL UP-7635
NAME ECG/CPU (5/5) CONNECTOR

HIGH VOLTAGE BD
UP-7636



9763657 HV
CAP +
CAP −
R532
R533
R534
R535
R529
R530
R531
D510
D511
D512
D513
C514
R517
R518
T500-4 (RED)
T500-5 (WHITE)
RLY501
CNJ545
INSULOK
Q503
D515
R521
R522
TO HV COIL
TO TEST DETECT
CNJ515
CNJ555
TP503
TP502
TP501
TP722
TP721
VR720
IC720
D721
D720
C723
C724
C722
C726
R724
R728
L501
IC503
R525
D519
R526
D518
R539
Q507
C721
R727
VR721
R543
D504
R545
D508
C510
D517
TP506
L502
R515
R516
R538
LIMIT TEST
J501
R520
R519
R542
EMPH ADJ
C509
R514
R524
R510
C515
C502
R509
R504
C501
Q508
IC505
IC508
C517
C518
C519
D520
D521
C520
IC501
IC502
C504
C503
C500
R500
R501
R502
R503
R506
R507
C505
Q505
C506
CNJ501 TO CPU
CHG TIME Q501
Q500
R540
C507
T500
Q502
CNJ511 TO POWER
R508
D504
TP504 (ECHG)
TP505 (+FB)
5 (WHITE)
4 (RED)


CHGON
R536 3.3K
Q505 C1345
R537 5.6K
C501 0.1 50V
+5V REF
D500 1S953
+12VB
R503 4.7K
D502 1S953(2)
R501 10K
1/4
3/4
EA2
1S1FH8
D503
C504
C502
R505 10K
R504
C503 35V 100μH
DT CMP PWM
OSC
REF
F.F
SECTION
PWM CMP
E1 14
C2 11
E2 10
FB
R531 100K
R502 33K
C500 470P
+12VB
EA2
R507 47Ω 1/2W
R506 100Ω 1/2W
Q500 2SD1271
Q501 2SB946
C506
R508 0.5Ω 2W
Q502 2SD1273
ECHG
TP505 (1.FB)
TP504 (ECHG)
R514 2W 0.6Ω
D504 S5FH8
R527 100K
VR500 10 KB
+12V CHG
R546
C507 6800μ
ECHG
CNJ535
D510
D511
RS-2 x4
D512
D513
VR501
2.1 KV P-P
EA2
R510 4.7K
C510 0.1μ
R515 14.3K
D506 1S953(3)
D508 1S953(3)
+5V
IC509 1/2 MPC 358C
+8.5V
-8.5V
D522
ENRG ADJ
R517 20MF
R518 20MF
R516 14.3K
D507 1S953(3)
D509 1S953(3)
R534 12K 1W
R531 12K 1W
R530 12K 1W
R533 12K 1W
R529 12K 1W
R532 12K 1W
R535 1K 3W
C514 0.002 4KV
EAT
INTRLCHK
CHGAD
R582 8.02KF
R583 8.02KF
R514 2.0KF
+5V REF
TP506 CHG AD
R538 2.0K
+12VB
INT RELAY NKR-102 RLY-501
INTRLY
R522 3.3K
R521 5.6K
Q503 DS71
EA2
+8.5
-8.5
EA
IC505 7808
IC506 7908
C519 0.1μ
D520
C517 0.1μ
C518 0.1μ
D521
C520 0.1μ
L501 10μH
L502 10μH
TP501
TP502
TP503
+6VT
-6VT
EAT
R721 39K
VR721 10K
(TT ENRG)
ENGAGE
UP-7636
CNJ501 M60-15-30-114P
IC720 1/2 MPC 812C
C725 0.001μ
D720
D721
C724 0.033μ
R724 220Ω
VR720 100K (TTRGAIN)
R721 68K
R720 470Ω 1/4W
IC503 16 → +6VT 6.8.10 → EA 7 → -6VT
C723 6.8μ
IC502 4538
R521 10K
R522
+6VT
EAT
2SC503 1/3
X0 X1
C510 0.33μ
D517
R526 470Ω
D518
CNJ555 M60-3-30-134P
CNP555 M62M83-3
BLUE
RED
CNJ525
Q520 2SK
D519 S1FH8
+12VH
R547
R524 3.3K
EXT RLY
UP-7596
PC580 PC827
R581 1K 1/2W
R580 1K 3W
TEST LOAD 56
DCHGCHK
TTREST
PADDLE
APEX PADDLE

△×
△×
△×
△×
△×
B × 2 62 2 4
A × 5 61 10 29

変更 REVIS	理由 REASON	年月日 DATE	検図 CHK

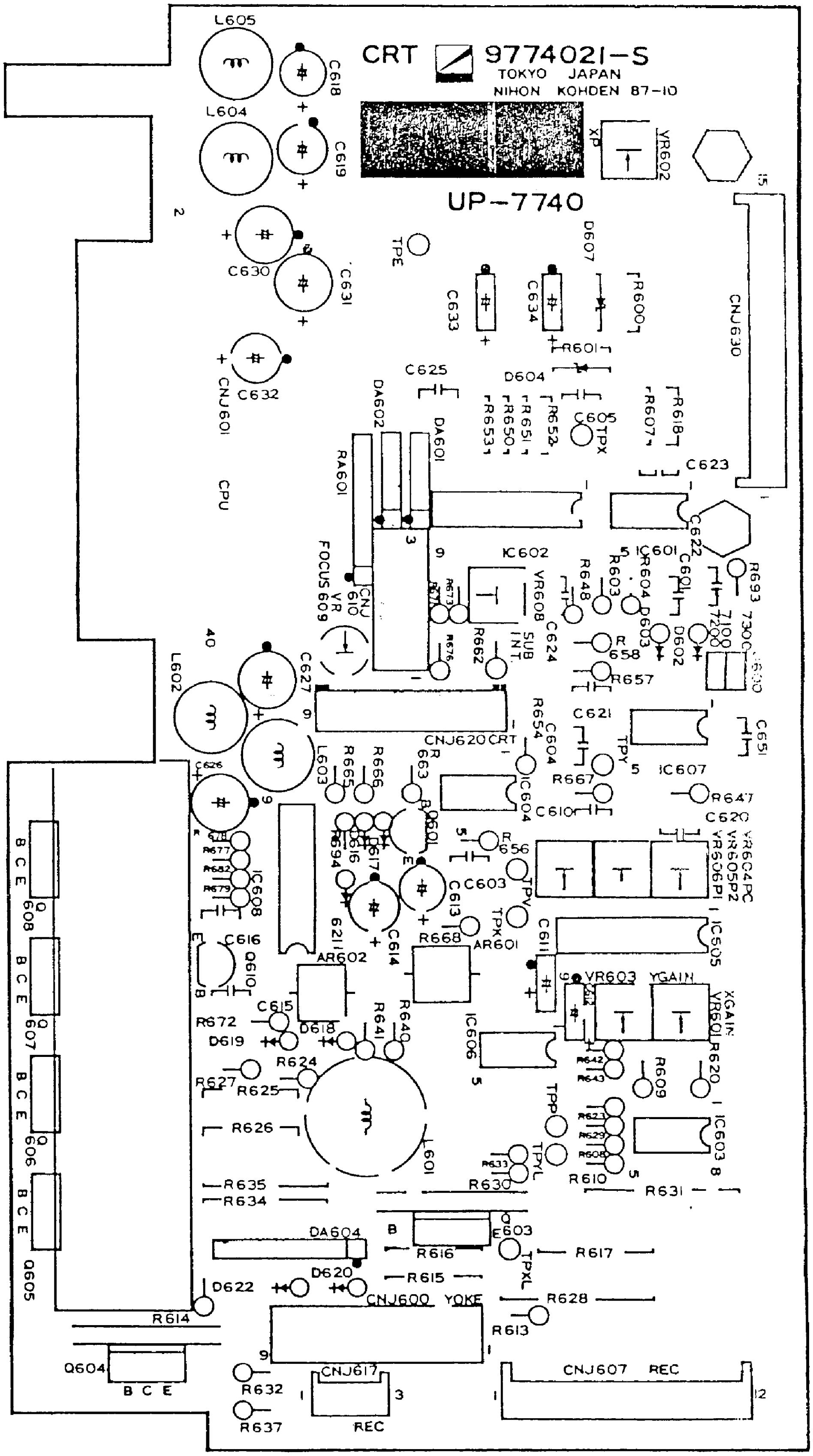
CHK
DESIGN
TRACE

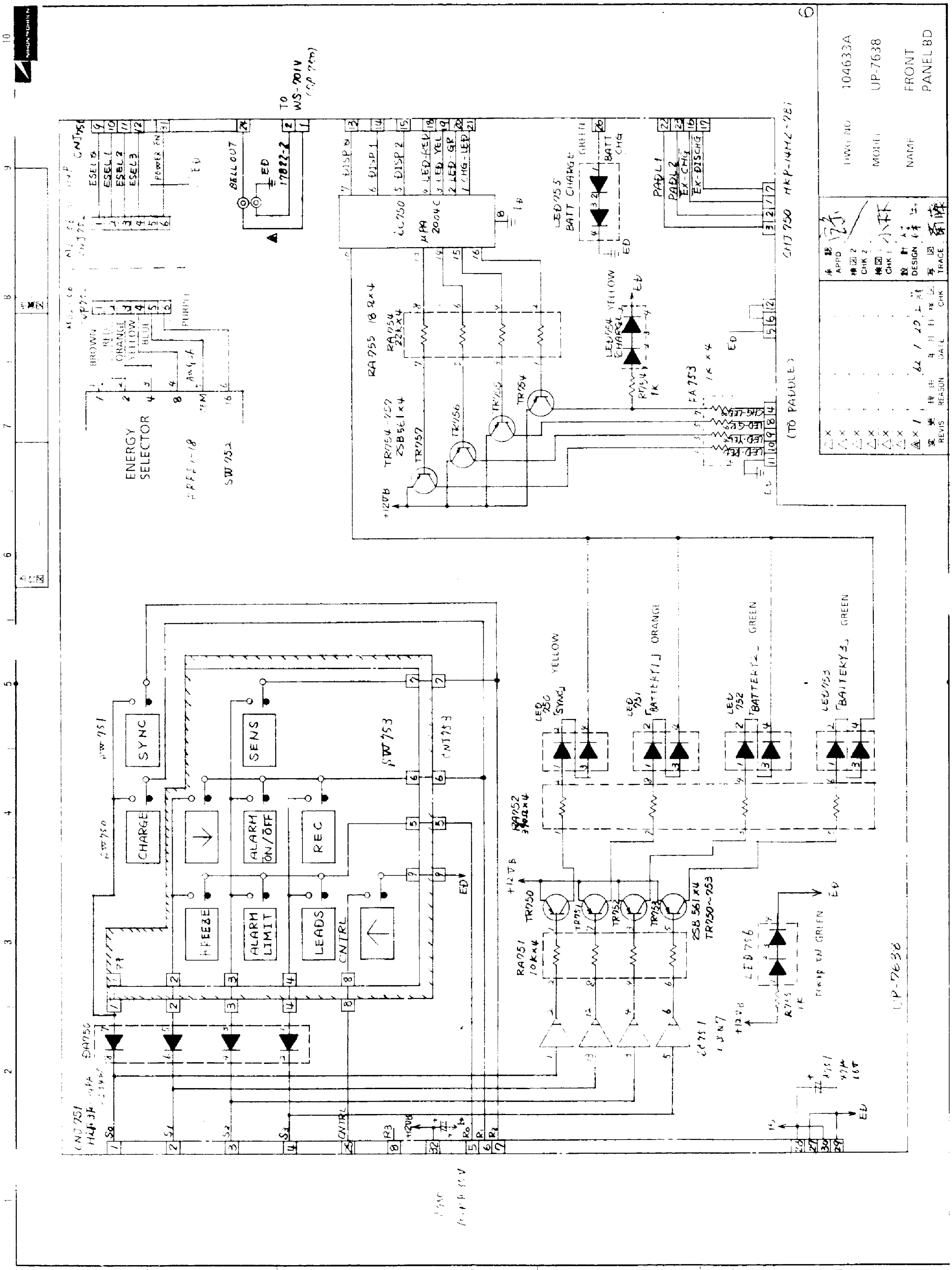
DWG NO 104630B
MODEL UP-7636 UP-7596
NAME HV BD TEST DETECT BD

6

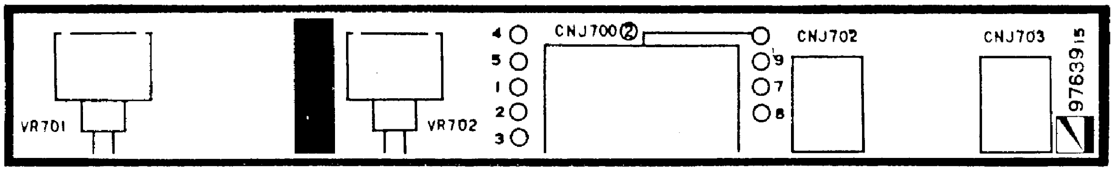
TEC7100/7200/7300.01

CRT DRIVER BD
UP-7740


CRT
9774021-S
TOKYO JAPAN
NIHON KOHDEN 87-10
UP-7740
L605
L604
C618
C619
C630
C631
C632
CNJ601
CPU
TPE
C633
C634
D607
R600
R601
CNJ630
XP
VR602
15
2
C625
D604
DA602
DA601
RA601
R653
R650
R651
R652
C605
TPX
R607
R618
C623
C622
IC601
IC602
R648
R603
R604
D603
D602
R693
7100
7200
7300
C601
FOCUS 609
VR
CNJ 610
VR608
SUB INT.
C624
R662
R658
R657
40
L602
C627
L603
CNJ620 CRT
R654
C604
C621
TPY
C651
IC607
R647
R667
C610
C620
R665
R666
R663
IC604
Q601
R656
C603
TPV
TPX
VR604 PC
VR605 P2
VR606 P1
C626
IC608
R677
R682
R679
R694
D616
D617
C614
C613
C611
IC505
Q608
Q607
Q606
Q605
B C E
C616
Q610
R668
AR602
AR601
VR603
YGAIN
XGAIN
VR601
C615
R672
D619
D618
R641
R640
IC606
R642
R643
R609
R620
R627
R624
R625
R626
TPP
IC603
R623
R629
R608
R610
R633
TPYL
L601
R635
R634
R630
R631
DA604
Q603
R616
TPXL
R617
D620
D622
R615
R628
CNJ600 YOKE
R614
R613
Q604
B C E
9
1
R632
CNJ617
REC
R637
3
CNJ607 REC
12

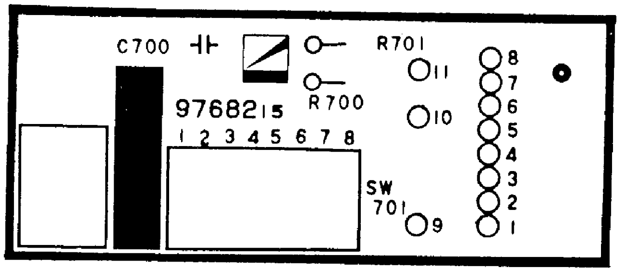

DWG NO 104633A
MODEL UP-7638
NAME FRONT PANEL BD
UP-7638
ENERGY SELECTOR
SW751
CNJ750
CNJ751
TO WS-701V
BELL OUT
ESEL0
ESEL1
ESEL2
ESEL3
POWER ON
DISP0
DISP1
DISP2
LED-REV
LED-YEL
LED-GR
CHG-LED
IC750 μPA2004C
LED755 BATT CHARGE
BATT CHG
GREEN
LED754 CHARGE YELLOW
PADL1
PADL2
EX-CHG
EX-DISCHG
CNJ750 HKP-14HC-7E1
RA755
RA754 22k×4
RA753 1k×4
TR754~757 2SB561×4
TR757
TR756
TR755
TR754
+12VB
(TO PADDLE)
BROWN
RED
ORANGE
YELLOW
BLUE
PURPLE
SYNC
CHARGE
SENS
ALARM ON/OFF
REC
FREEZE
ALARM LIMIT
LEADS
CNTRL
SW750
SW753
CNT753
LED750 SYNC YELLOW
LED751 BATTERY1 ORANGE
LED752 BATTERY2 GREEN
LED753 BATTERY3 GREEN
RA752
TR750
TR751
TR752
TR753
2SB561×4 TR750~753
RA751 10k×4
IC751
LED756
R755 1k
DA750
S0
S1
S2
S3
CNTRL
R3
+12VB
R0
R1
R2
ED
APPD
CHK
DESIGN
TRACE
REVIS
REASON
DATE

VR AND CONNECTOR BD
UP-76391
UP-76392
UP-76393

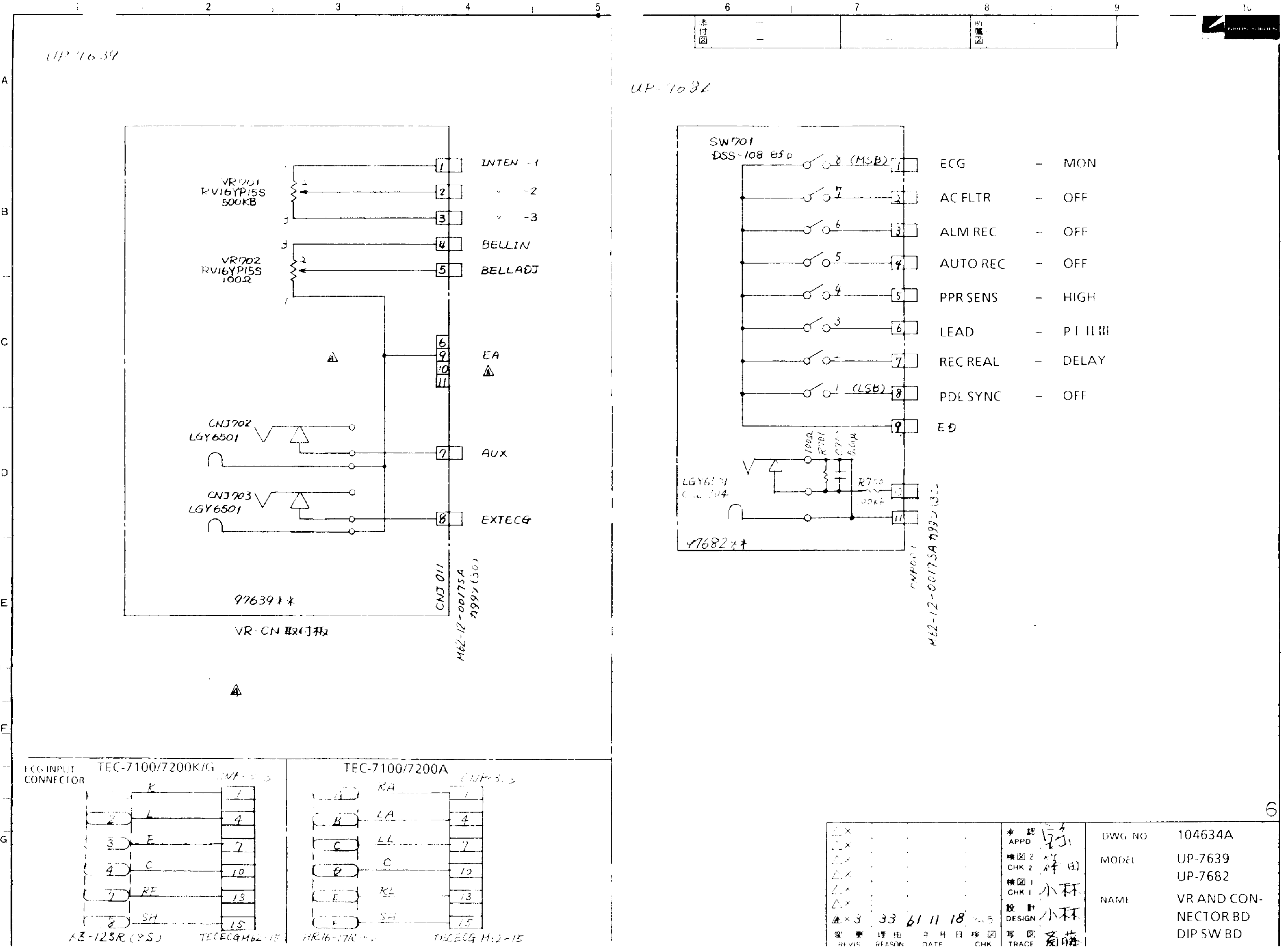


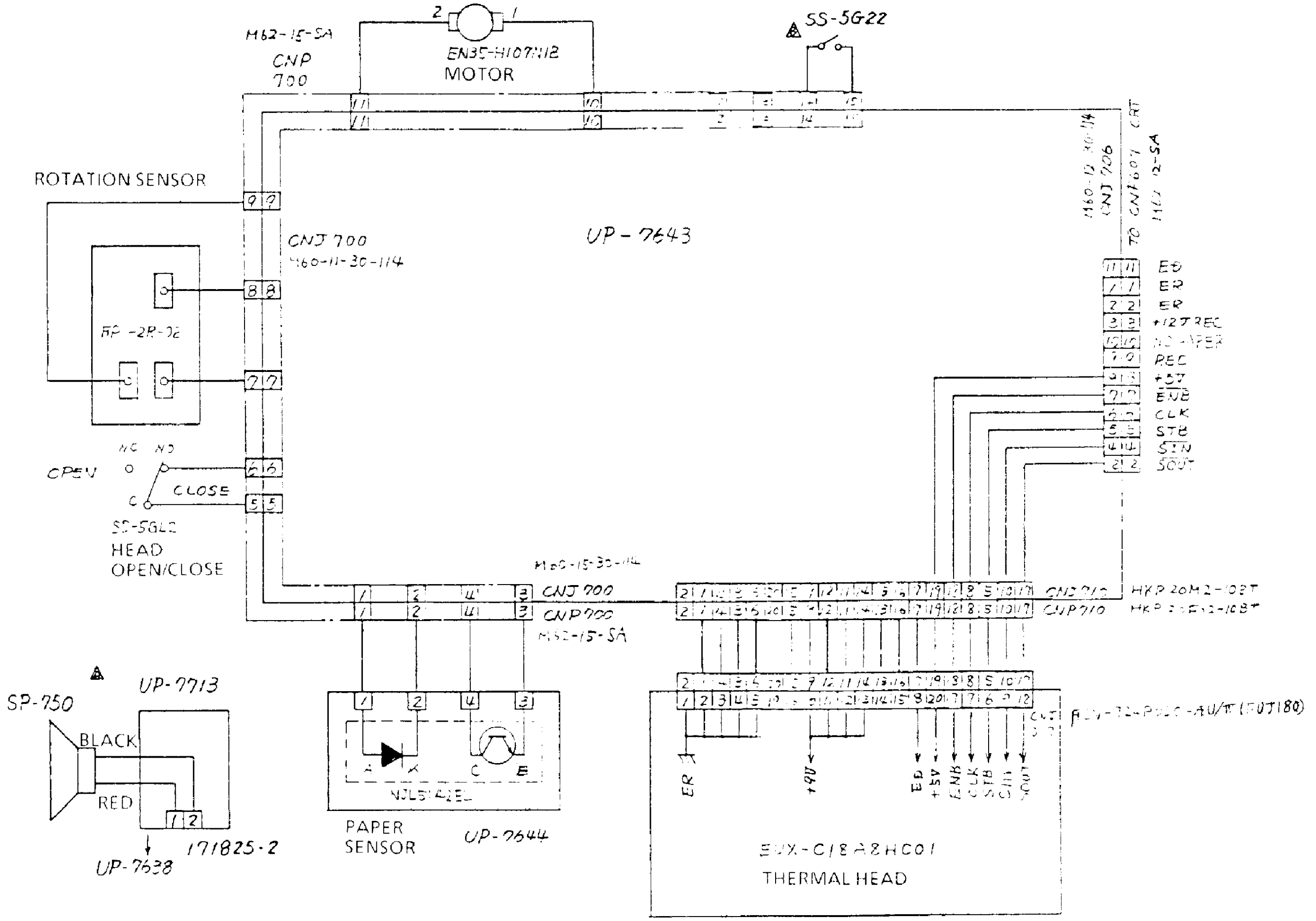
VR701
VR702
4
5
1
2
3
CNJ700 ②
9
7
8
CNJ702
CNJ703
9763915

DIP SW BD
UP-7682



C700
R701
R700
9768215
1 2 3 4 5 6 7 8
SW 701
11
10
9
8
7
6
5
4
3
2
1


UP 7639
UP-7682
INTEN -1
-2
-3
BELLIN
BELLADJ
EA
AUX
EXTECG
VR701
RV16YP15S
500KB
VR702
RV16YP15S
100Ω
CNJ702
LGY6501
CNJ703
LGY6501
97639★★
CNJ 011
M62-12-0017SA
ｶﾜｲ(50)
VR·CN 取付板
SW701
DSS-108 8fb
8 (MSB)
1 (LSB)
ECG - MON
AC FLTR - OFF
ALM REC - OFF
AUTO REC - OFF
PPR SENS - HIGH
LEAD - P I II III
REC REAL - DELAY
PDL SYNC - OFF
ED
100Ω
R701
C701
0.01μ
R702
LGY6101
97682★★
CNH001
M62-12-0017SA ｶﾜｲ(50)
ECG INPUT CONNECTOR
TEC-7100/7200K/G
TEC-7100/7200A
K
L
F
C
RF
SH
RA
LA
LL
C
RL
SH
XZ-123R(PS)
TECECG M62-15
HR16-17R
TECECG M62-15
DWG NO 104634A
MODEL UP-7639
UP-7682
NAME VR AND CONNECTOR BD
DIP SW BD
APPD
CHK 2
CHK 1
DESIGN
TRACE
REVIS
REASON
DATE
CHK
33 61 11 18
小林
小林
斎藤
6



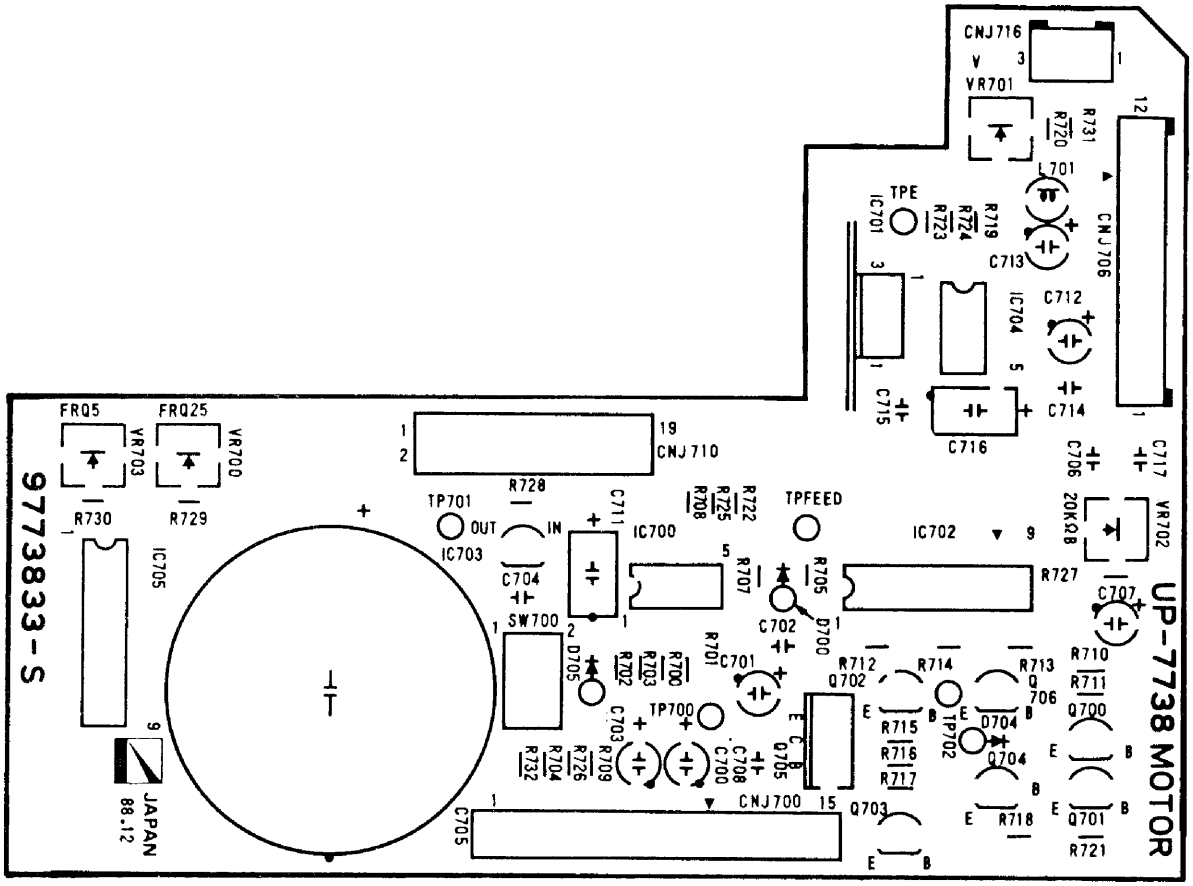
M62-15-SA
CNP 700
2
1
EN35-H107N12
MOTOR
SS-5G22
ROTATION SENSOR
RP-2R-02
CNJ 700
H60-11-30-114
UP-7643
H60-12-30-114
CNJ 706
TO CN607 CRT
H62-12-SA
ED
ER
ER
+12V REC
NO PAPER
REC
+5V
ENB
CLK
STB
SIN
SOUT
OPEN
NC
NO
CLOSE
C
SS-5GL2
HEAD
OPEN/CLOSE
H60-15-30-114
CNJ 700
CNP 700
H62-15-SA
CNJ 710
CNP 710
HKP 20M2-10BT
HKP 20F12-10BT
SP-750
BLACK
RED
UP-7713
171825-2
UP-7638
A
K
C
E
NJL5142EL
PAPER
SENSOR
UP-7644
ER
+9V
ED
+5V
ENB
CLK
STB
SIN
SOUT
CN1
FLV-T24-P...-AU/T (FUJ180)
EUX-C18A8HC01
THERMAL HEAD

DWG NO 104714B

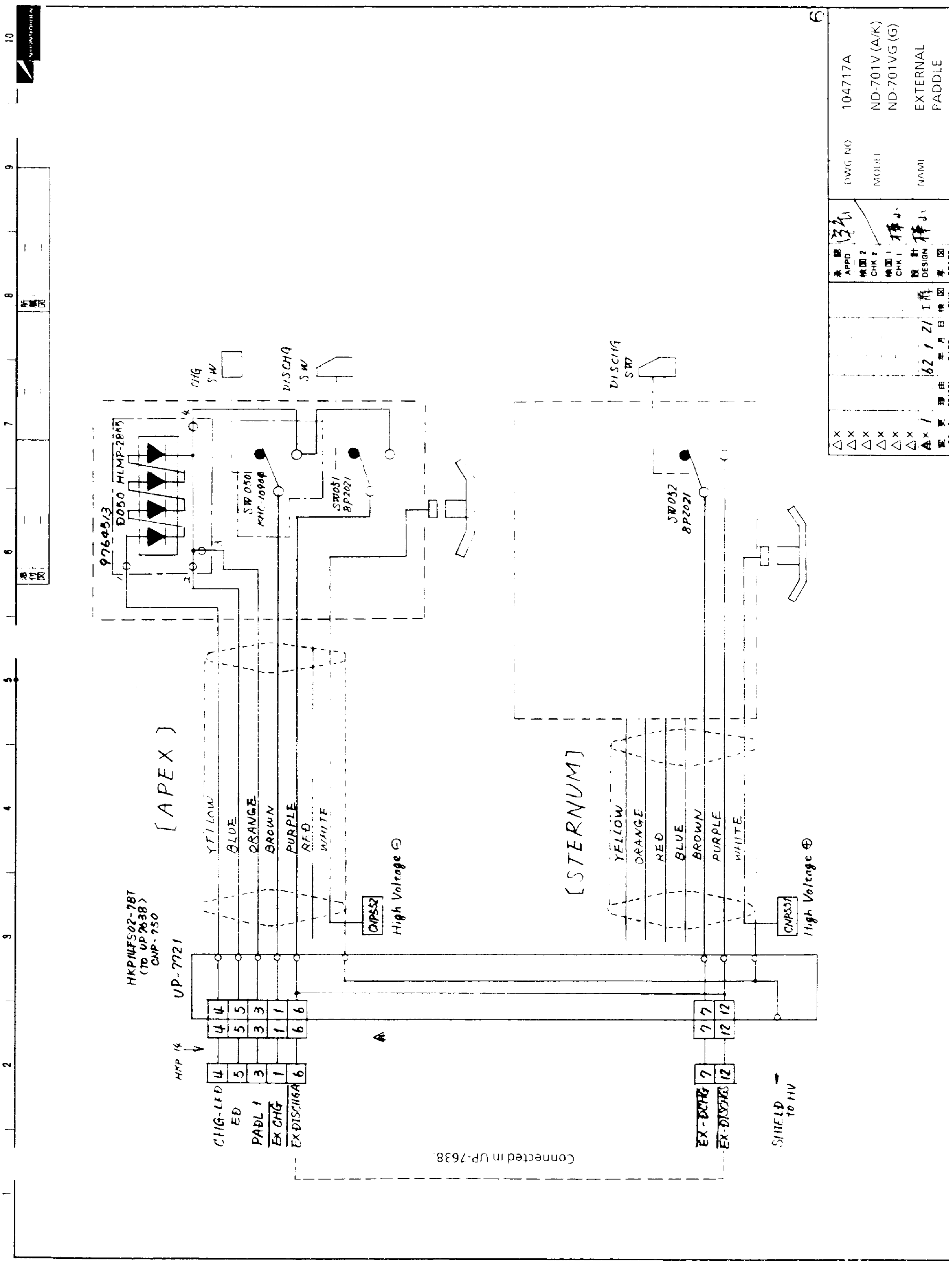
MODEL WS-701V

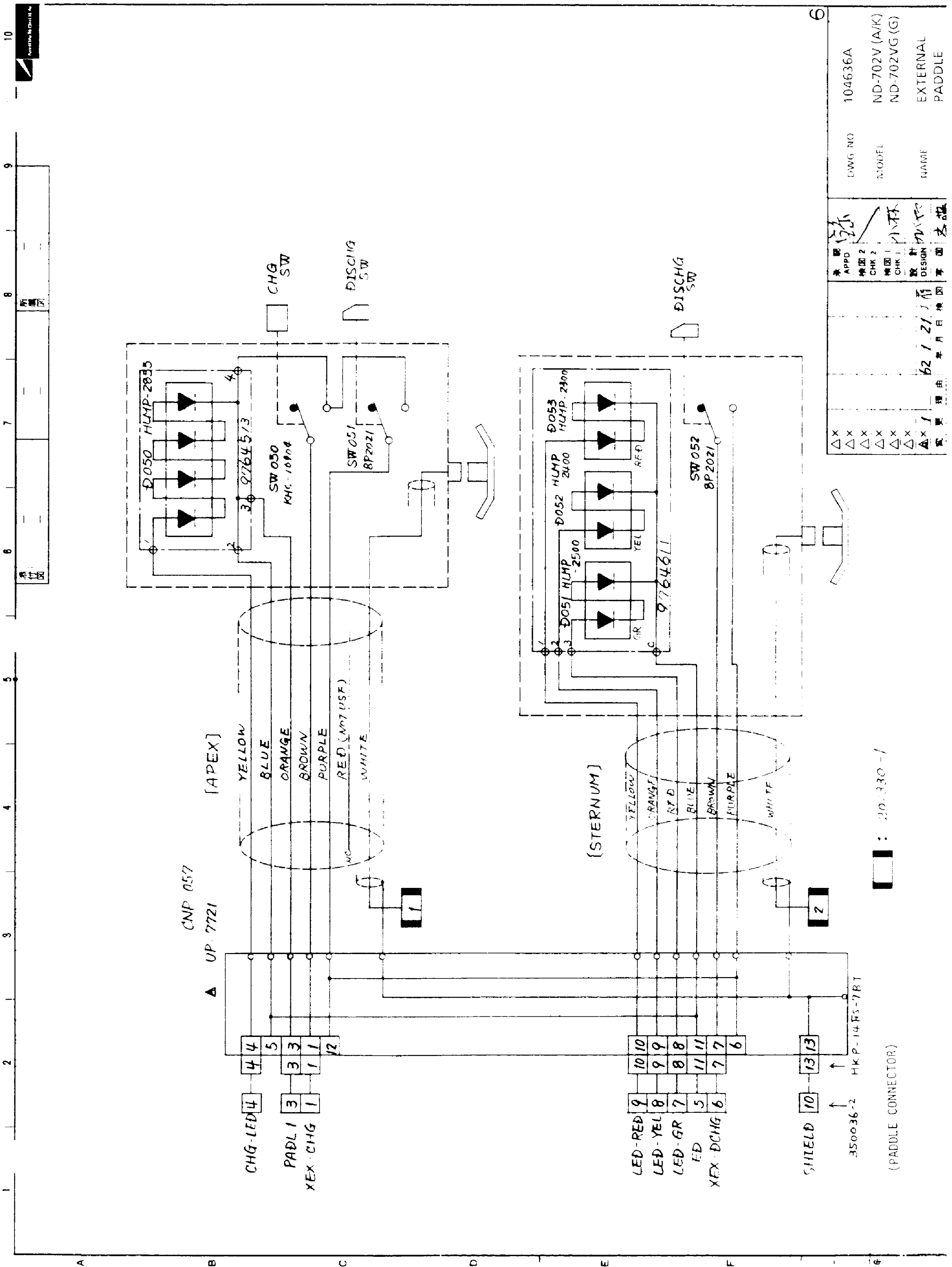
NAME MOTOR CONTROL BD

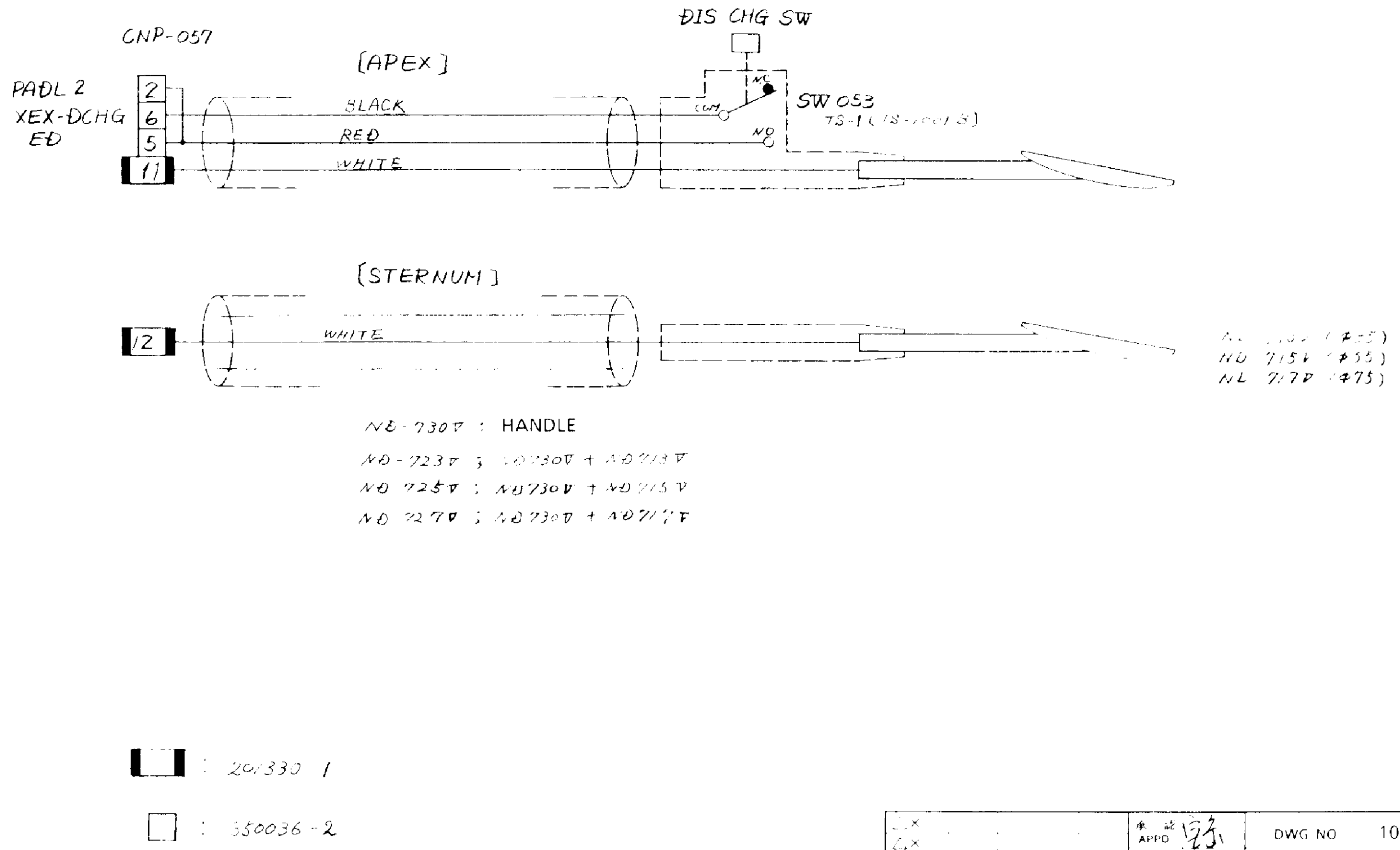
MOTOR CONTROL BD
UP-7738



CNJ716
VR701
R720
R731
L701
TPE
IC701
R723
R724
R719
C713
CNJ706
C712
IC704
C715
C714
C716
C706
C717
VR702
20KΩB
UP-7738 MOTOR
97773833-S
FRQ5
FRQ25
VR703
VR700
R730
R729
IC705
CNJ710
R728
TP701
OUT
IN
IC703
C704
C711
IC700
R708
R725
R722
TPFEED
IC702
R727
C707
R710
R711
Q700
R707
R705
C702
D700
SW700
D705
R702
R703
R700
R701
C701
R712
Q702
R714
R713
Q706
TP700
C703
C700
C708
D705
R715
R716
R717
TP702
D704
Q704
R718
Q701
R721
R732
R704
R726
R709
C705
CNJ700
Q703
JAPAN
88.12

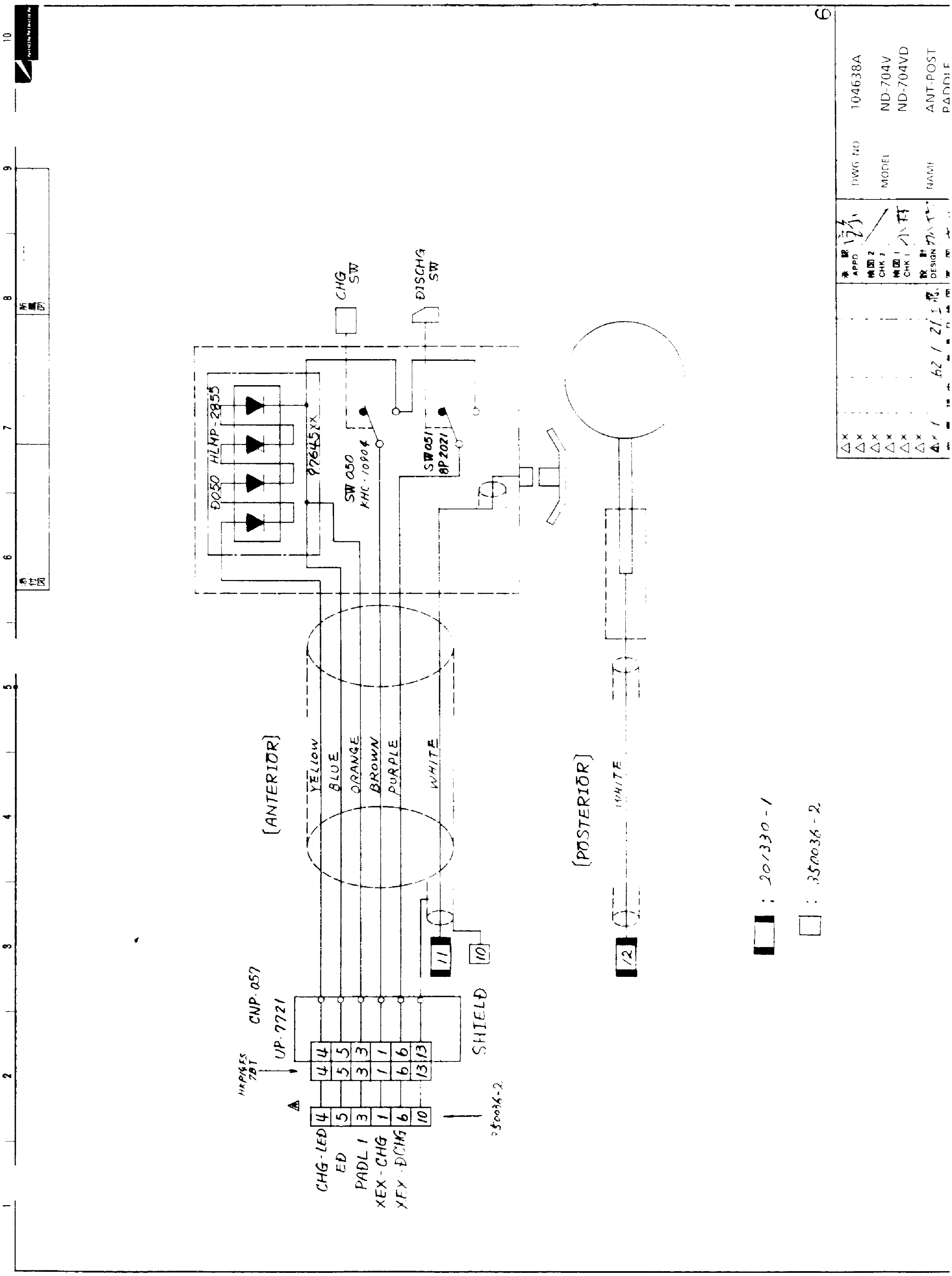

104717A
ND-701V (A/K)
ND-701VG (G)
EXTERNAL PADDLE
DWG NO
MODEL
NAME
APPD
CHK 2
CHK 1
DESIGN
62 1 21
[APEX]
[STERNUM]
CHG SW
DISCHG SW
97645/3
D050 HLMP-2800
SW050 KHC-10900
SW051 8P2021
SW052 8P2021
YELLOW
BLUE
ORANGE
BROWN
PURPLE
RED
WHITE
CNP552
CNP551
High Voltage ⊖
High Voltage ⊕
HKP14FS02-7BT (TO UP7638) CNP-750
UP-7721
HKP 14
CHG-LED
PADL 1
EX CHG
EX DISCHGA
EX-DCHG
EX-DISCHG
SHIELD TO HV
Connected in UP-7638
4 5 3 1 6 7 12
A B C D E F G
1 2 3 4 5 6 7 8 9 10

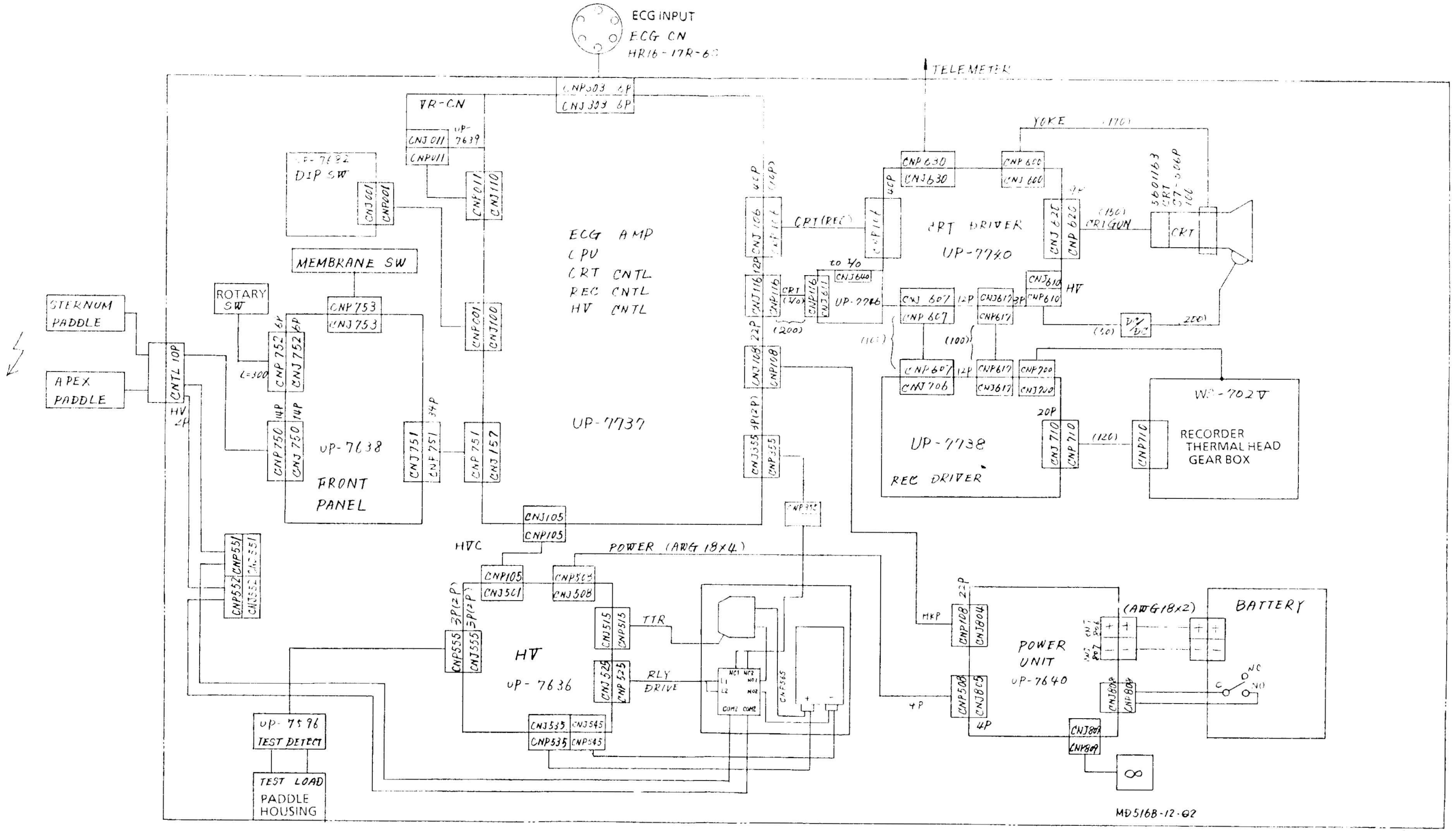

DWG NO 104636A
MODEL ND-702V (A/K)
ND-702VG (G)
NAME EXTERNAL PADDLE
APPD
CHK 2
CHK 1
DESIGN
[APEX]
CHG SW
DISCHG SW
D050 HLMP-2855
97645/3
SW050 KHC-10904
SW051 8P2021
YELLOW
BLUE
ORANGE
BROWN
PURPLE
RED (NOT USE)
WHITE
NC
1
(STERNUM)
DISCHG SW
D053 HLMP-2300
D052 HLMP-2400
D051 HLMP-2500
9764611
RED
YEL
GR
SW052 8P2021
YELLOW
ORANGE
RED
BLUE
BROWN
PURPLE
WHITE
2
: 201330-1
CNP 057
UP 7721
HKP-14FS-7BT
350036-2
(PADDLE CONNECTOR)
CHG-LED
PADL1
XEX-CHG
LED-RED
LED-YEL
LED-GR
ED
XEX-DCHG
SHIELD


CNP-057
PADL 2
XEX-DCHG
ED
2
6
5
11
[APEX]
BLACK
RED
WHITE
DIS CHG SW
NC
COM
NO
SW 053
TS-1 (TS-1001 B)
[STERNUM]
12
WHITE
ND 713V (φ35)
ND 715V (φ55)
ND 717V (φ75)
ND-730V : HANDLE
ND-723V ; ND730V + ND713V
ND 725V ; ND730V + ND715V
ND 727V ; ND730V + ND717V
: 201330 1
: 350036-2

△×				承認 APPD	DWG NO	104637
△×				検図 2 CHK 2	MODEL	ND-723V ND-725V ND-727V
△×				検図 1 CHK 1 小林		
△×				設計 DESIGN カバヤマ	NAME	INTERNAL PADDLE
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK	写図 TRACE 斎藤		

6


6
DWG NO 104638A
MODEL ND-704V
ND-704VD
NAME ANT-POST PADDLE
APPD
CHK 2
CHK 1
DESIGN
62 / 2 / 1
CHG SW
DISCHG SW
D050 HLMP-2855
97645XX
SW050 KHC-10904
SW051 8P2021
(ANTERIOR)
YELLOW
BLUE
ORANGE
BROWN
PURPLE
WHITE
(POSTERIOR)
WHITE
11
10
12
: 20/330-1
: 350036-2
CNP-057
UP-7721
SHIELD
4 5 3 1 6 13
4 5 3 1 6 13
4 5 3 1 6 10
350036-2
CHG-LED
ED
PADL 1
XEX-CHG
XEY-DCHG


ECG INPUT
ECG CN
HR16-17R-6
TELEMETER
CNP303 6P
CNJ303 6P
VR-CN
CNJ011
UP-7639
CNP011
UP-7632
DIP SW
CNJ001
CNP001
CNP011
CNJ110
ECG AMP
CPU
CRT CNTL
REC CNTL
HV CNTL
UP-7737
MEMBRANE SW
ROTARY SW
STERNUM PADDLE
APEX PADDLE
CNTL 10P
HV 2P
CNP753
CNJ753
CNP752 6P
CNJ752 6P
L=300
CNP750 14P
CNJ750 14P
UP-7638
FRONT PANEL
CNJ751 34P
CNP751
CNP751
CNJ157
CNP001
CNJ100
CNJ105
CNP105
CNP551
CNJ551
CNP552
CNJ552
HVC
POWER (AWG 18×4)
CNP105
CNJ501
CNP508
CNJ508
CNP555 3P(2P)
CNJ555 3P(2P)
CNJ515
CNP515
TTR
HV
UP-7636
CNJ525
CNP525
RLY DRIVE
NC1 NC2 L1 L2 NO1 NO2 COM1 COM2
CNP565
+
-
CNJ535
CNJ545
CNP535
CNP545
UP-7596
TEST DETECT
TEST LOAD
PADDLE HOUSING
CNJ106 40P
CNP106 (10P)
CRT(REC)
CNP106
40P
CNP630
CNJ630
CNP600
CNJ600
YOKE (170)
CRT DRIVER
UP-7740
CNJ620 9P
CNP620
(150)
CRTGUN
5601163
CRT
07-306P
100
CRT
CNJ116 12P
CNP116
CRT (I/O)
(200)
CNP116
CNJ611
to I/O
CNJ640
UP-7746
CNJ607
CNP607
12P
CNJ617 3P
CNP617
CNJ610
CNP610
HV
DC/DC
(50)
(200)
(100)
(100)
CNJ108 22P
CNP108
CNP607
CNJ706
12P
CNP617
CNJ617
CNP700
CNJ700
UP-7738
REC DRIVER
20P
CNJ710
CNP710
(120)
CNP710
WS-702V
RECORDER
THERMAL HEAD
GEAR BOX
CNJ355 3P(2P)
CNP355
CNP355
22P
HKP
CNP108
CNJ804
POWER UNIT
UP-7640
(AWG18×2)
+
-
BATTERY
C
NC
NO
4P
CNP508
CNJ805
4P
CNJ808
CNP808
CNJ809
CNP809
∞
MD516B-12-02
1
2
3
4
5
6
7
8
9
10
11
12
13
14
A
B
C
D
E
F
G
H

APPD	DWG NO	105560
CHK 2	MODEL	TEC-7300
CHK 1	NAME	BOARD CONNECTION
DESIGN		
REVIS. REASON DATE CHK	TRACE		

CNJ 057 (CHASSIS)

to CNJ 750 (FRONT PANEL)
HKP-14MS-7BT

	1	—	1	$\overline{\mathrm{EX-CHG}}$
	2	—	2	PADL2
	3	—	3	PADL 1
FRONT PANEL	4	—	4	CHG-LED
to CNJ750	5	—	5	ED
	7	—	6	$\overline{\mathrm{EX-DISCHG}}$
	8	—	7	LED-GR
	9	—	8	LED-YEL
	10	—	9	LED-RED
HV		—	10	SHIELD

CNJ 100 (CPU)
M60-12-30-114P
to CNJ 001 (DIP SW)
M60-12-30-114P

		1	DIP-0
	—	2	DIP-1
	—	3	DIP-2
	—	4	DIP-3
	—	5	DIP-4
	—	6	DIP-5
	—	7	DIP-6
	—	8	DIP-7
	—	9	ED
	—	10	∠BECG+
	—	11	EA
	—	12	

CNJ 105 (CPU)
M60-15-30-114
to CNJ 501 (HV)
M60-15-30-114

		1	CHG ON
		2	INT-RLY
		3	EXT-RLY
		4	$\overline{\mathrm{DCHG\ CHK}}$
		5	TTRRST
		6	TTR OUT
		7	OVER-CHG
		8	CHG AD
		9	
		10	+8.5V
		11	EA
		12	-8.5V
		13	EARG ADJ
		14	—
		15	

CNJ 106 (CPU)
HVF3ASC 40D
to CNJ 601 (CRT, REC)

12V REC	1	2	$\overline{\mathrm{SOUT}}$
ER	3	4	ER
-6V	5	6	+5V
+6V	7	8	-8.5V
+8.5V	9	10	12V CRT
$\overline{\mathrm{SIN}}$	11	12	STB
PRT CLK	13	14	$\overline{\mathrm{ENB}}$
REC	15	16	NO PAPER
EY	17	18	EY
CH1/$\overline{\mathrm{CH2}}$	19	20	V SYNC
HSYNC	21	22	25/5 mm/s
BLANK1	23	24	WAVE / $\overline{\mathrm{CHR}}$
BRIGHT	25	26	Y SIG
INTENS-3	27	28	INTENS-2
INTENS-1	29	30	EA
TELEW	31	32	$\overline{\mathrm{ART}}$
$\overline{\mathrm{RCVFLT}}$	33	34	$\overline{\mathrm{TELE}}$
$\overline{\mathrm{CALL}}$	35	36	$\overline{\mathrm{ZBB}}$
CHANNEL AD	37	38	+12VB
ED	39	40	ED

CNJ 108 (CPU)
HKP-22MS-11BT
to CNJ 804 (POWER)
HKP-22MS-11BT

EA	1	2	EA
ED	3	4	ED
ER	5	6	ER
EY	7	8	EY
+5V	9	10	-6V
8.5V	11	12	+6V
+12V CRT	13	14	+8.5V
+12V REC	15	16	BAT CHG
BATT OFF	17	18	AC
+12VB	19	20	POWER ON
+12VB	21		

CNJ 110 (CPU)
M60-12-30-114
to CNJ 011 (VR CONNECTOR BD)
M60-12-30-114

		1	INTENS-1
		2	INTENS-2
		3	INTENS-3
		4	BELL IN
		5	BELL RET
		6	
		7	AUX
		8	EXT ECG
		9	EA
		10	
		11	
		12	

CNJ 116 (CPU)
M60-12-30-114
to CNJ 611 (I/O CONNECTOR BD)
M60-12-30-134

CLK	1	2	RxD
TxD	3	4	RxRDY
$\overline{\mathrm{RTS}}$	5	6	ED
ED	7	8	
EA	9	10	DR. ECG×5
+12VB	11	12	+12VB

変更 REVIS	理由 REASON	年 月 日 DATE	検図 CHK	承認 APPD	DWG NO	105556
				検図 2 CHK 2	MODEL	TEC-7300
				検図 1 CHK 1	NAME	CONNECTOR PIN ASSIGNMENT (1/3)
				設計 DESIGN		
				写図 TRACE		

CNJ 157 (CPU)
HLF3FB-34PA-2.54DS
to CNP751 (FRONT PANEL)
HLF2.3A-34D-BC (10)

So	1	2	S1
S2	3	4	S3
RO	5	6	R1
R2	7	8	R3
ESEL-0	9	10	ESEL-1
ESEL-2	11	12	ESEL-3
DISP-0	13	14	DISP-1
DISP-2	15	16	$\overline{\text{EX-CHG}}$
$\overline{\text{EX-DISCHG}}$	17	18	LED-RED
LED-YEL	19	20	LED-GR
CHG-LED	21	22	PADL 1
PADL 2	23	24	BELL OUT
$\overline{\text{CNTL}}$	25	26	BATTCHG
ED	27	28	+5V
ED	29	30	+5V
POWER ON	31	32	+12VB
- -	33	34	—

CNJ 303 (ECG AMP)
M60-15-30-114
to CNJ 003 (ECG CONNECTOR)
HR16-17R-6S

		1	RA (R)
		2	—
		3	—
		4	LA (L)
		5	—
		6	—
		7	LL (F)
		8	—
		9	—
		10	RL (RF)
		11	—
		12	—
		13	V (C)
		14	—
		15	SHIELD

CNJ511 (HV)
350543-1 (AMP)
to CNJ 805 (POWER)
350543-1 (AMP)

		1	+12VCHG
		2	+12VCHG
		3	ECHG
		4	ECHG

CNJ 355 (ECG AMP)
M60-3-30-114
to CNJ 553 (HV UNIT)
M60-3-30-114

		1	P-ECG S
		2	—
		3	P-ECG A

CNJ 600 (CRT)
HKP-10H55-1T
to YOKE

		1	X1
		2	X2
		3	Y1
		4	Y2
		5	YP2
		6	YF1

CNJ 617 (CRT)
M60-03-30-134
to CNJ 716 (REC)
M60-03-30-114

		1	25/5 mm/s
		2	
		3	

CNJ 640 (I/O CONNECTOR BD)
M60-12-30-134
to OPTIONAL UNIT

CLK	1	2	RXD
TXD	3	4	RXRDY
$\overline{\text{RTS}}$	5	6	ED
ED	7	8	
	9	10	
	11	12	

CNJ 611 (I/O CONNECTOR BD)
M60-12-30-134
to CNJ 116 (CPU)

CLK	1	2	RXD
TXD	3	4	RXRDY
$\overline{\text{RTS}}$	5	6	ED
ED	7	8	
EA	9	10	OP.ECG×5
+12VB	11	12	+12VB

CNJ 607 (CRT)
M60-12-30-114
to CNJ 706 (REC)
M60-12-30-114

		1	ER
		2	ER
		3	+12VREC
		4	$\overline{\text{SIN}}$
		5	STB
		6	PRT CLK
		7	$\overline{\text{ENB}}$
		8	+5V
		9	REC
		10	NOPAPER
		11	EL
		12	SOUT

CNJ 620 (CRT)
M60-9-30-114
to CRT NECK
57-506P-100

		1	G1
		2	K
		3	H
		4	H
		5	
		6	G2
		7	G4

CNJ 808 (POWER)
171825-2
to BATTERY

		1	LED +
		2	LED -

CNJ 806 (POWER)
170267-1
to BATTERY

		1	BAT +

CNJ 807 (POWER)
170267-1
to BATTERY

		1	BAT -

承認 APPD		DWG NO	105557
検図2 CHK 2		MODEL	TEC-7300
検図1 CHK 1	小林	NAME	CONNECTOR PIN ASSIGNMENT (2/3)
設計 DESIGN	小林		

CNJ 630 (CRT)
M60-15-30-134
to TELEMETER

	1	2	
+5V	3	4	-6V
+6V	5	6	ED
EA	7	8	+12VB
CHANNEL AD	9	10	$\overline{\text{ZBB}}$
$\overline{\text{CALL}}$	11	12	$\overline{\text{TELE}}$
$\overline{\text{RCVFLT}}$	13	14	$\overline{\text{ART}}$
TELEW	15		

CNJ 700 (REC)
M60-11-30-114
to RECORDER

		1	SENS-A
		2	SENS-K
		3	SENS-E
		4	SENS-C
		5	LVR-COM
		6	LVR-N.O
		7	SENS-−
		8	SENS-+
		9	SENS-OUT
		10	MOTOR1
		11	MOTOR2
		12	FEED-A
		13	FEED-K
		14	FEED-C
		15	FEED-E

CNJ 710 (REC)
HKP-20MS10BT
to (THERMAL HEAD)

ER	1	2	ER
ER	3	4	ER
STB	5	6	ER
ED	7	8	CLK
+9V	9	10	$\overline{\text{SIN}}$
+9V	11	12	+9V
	13	14	+9V
	15	16	
$\overline{\text{SOUT}}$	17	18	$\overline{\text{ENB}}$
+5V	19	20	

CNJ 750 (FRONT PANEL)
HKP-14MS-7BT
to CNJ 057 (PADDEL CONNECTOR)

$\overline{\text{EX-CHG}}$	1	2	PADL 2
PADL 1	3	4	CHG-LED
ED	5	6	$\overline{\text{EX-DISCHG-A}}$
$\overline{\text{EX-DISCHG}}$	7	8	LED-GR
LED-YEL	9	10	LED-RED
ED	11	12	$\overline{\text{EX-DISCHG-S}}$
—	13	14	—

CNJ 752 (ENERGY SELECTOR)
M60-06-30-119P

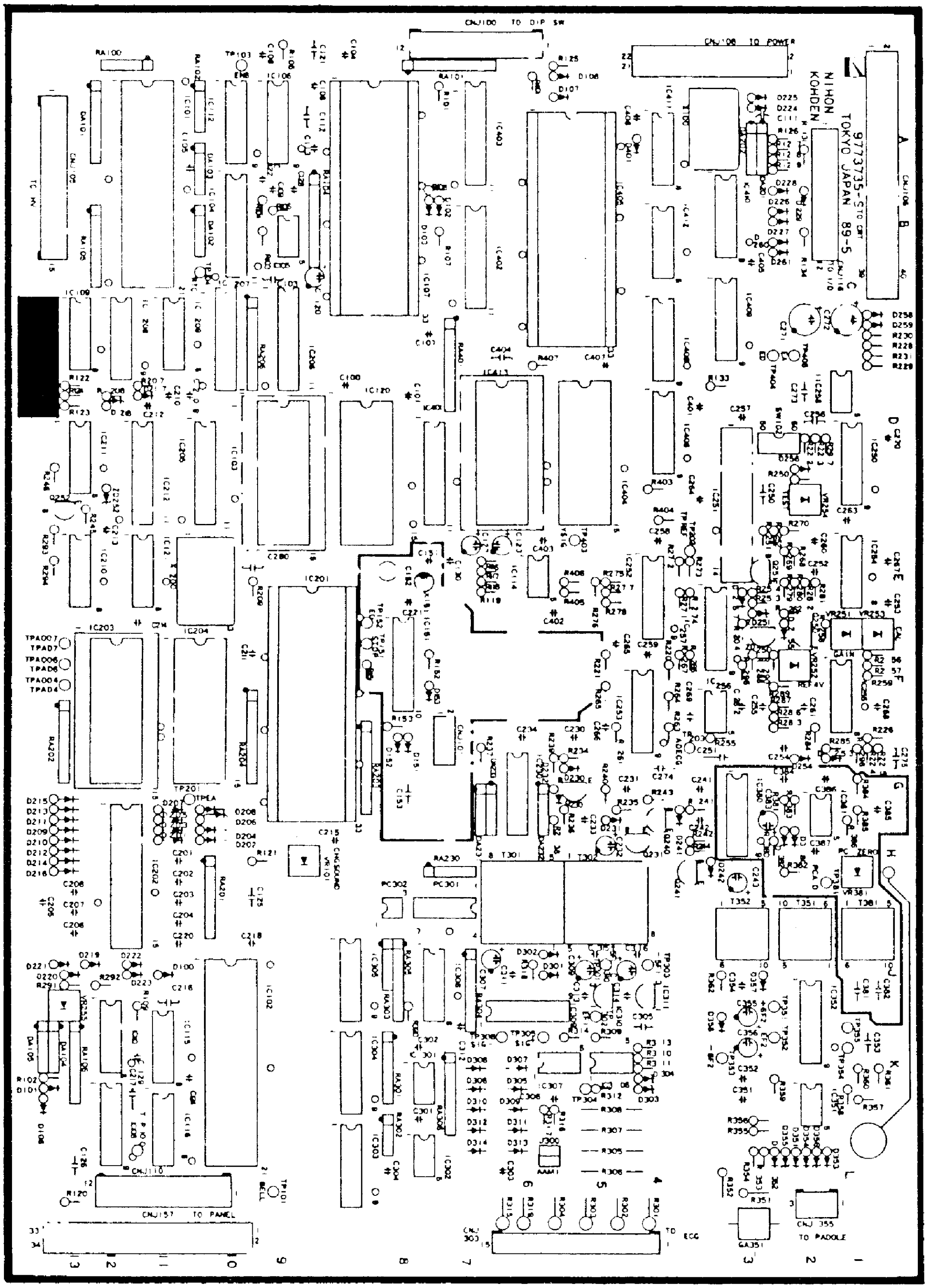
E SEL 0	1	2	E SEL 1
E SEL 2	3	4	E SEL 3
ED	5	6	POWER ON

変更 REVIS	理由 REASON	年月日 DATE	検図 CHK
△×			
△×			
△×			
△×			
△×			
△×			
△×			

承認 APPD	
検図 2 CHK 2	
検図 1 CHK 1	小林
設計 DESIGN	小林
写図 TRACE	

DWG NO	105558
MODEL	TEC-7300
NAME	CONNECTOR PIN ASSIGNMENT (3/3)

ECG / CPU BD
UP-7737



CNJ100 TO DIP SW
CNJ108 TO POWER
CNJ106
NIHON KOHDEN
TOKYO JAPAN
89-5
IC201
IC203
IC204
IC102
T301
T302
T351
T352
T381
CNJ157 TO PANEL
CNJ110
CNJ303 TO ECG
CNJ355 TO PADDLE
GA351
TP101 BELL
A
B
C
D
E
F
G
H
K
L
1
2
3
4
5
6
7
8
9
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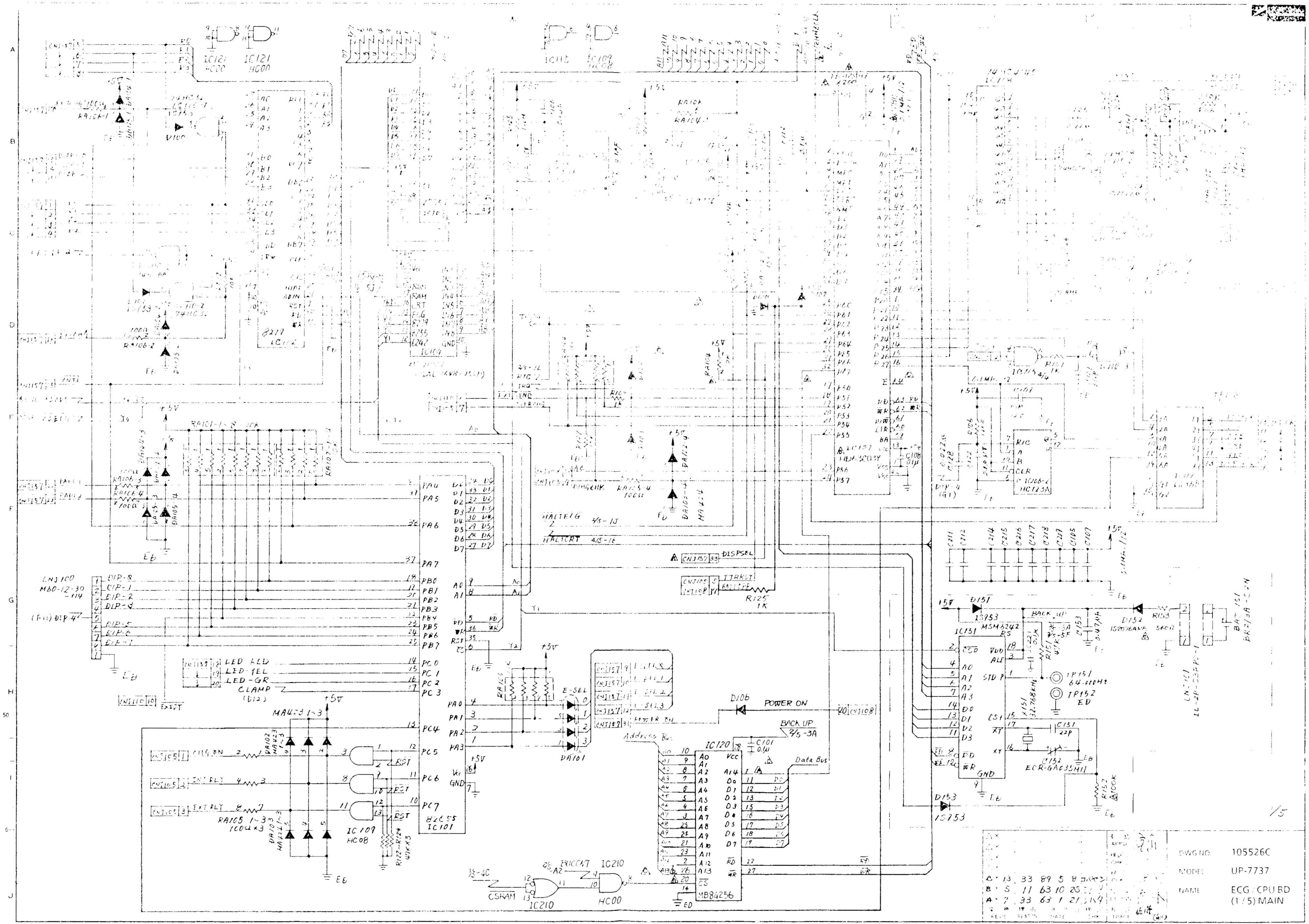
11
12
13



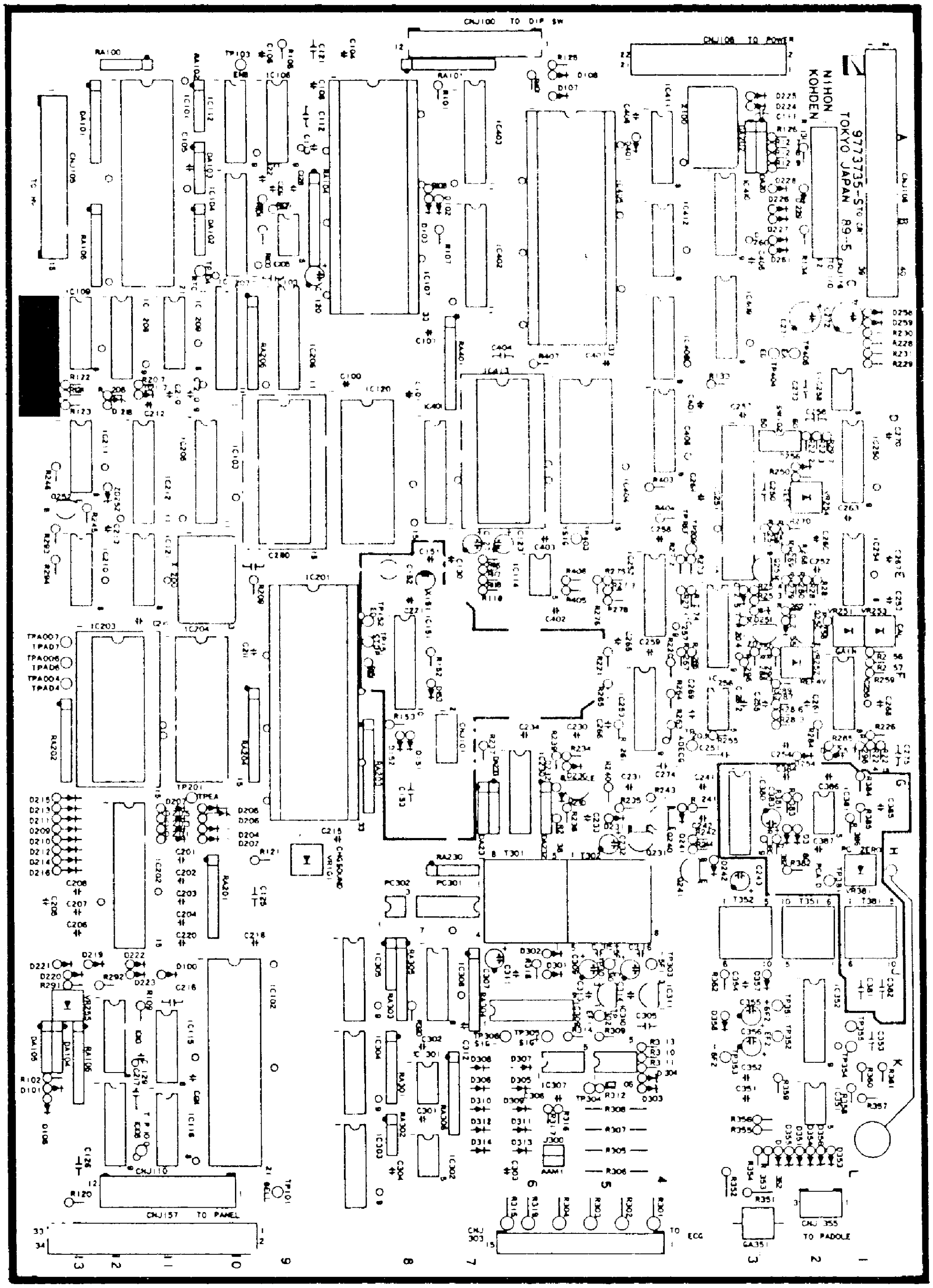
IC121 HC00
IC115
IC109 HC08
8255 IC101
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
RD
WR
RST
CS
GND
Vcc
CN3100
M60-12-30-114
DIP-R
DIP-1
DIP-2
DIP-3
DIP-4
DIP-5
DIP-6
DIP-7
LED RED
LED YEL
LED GR
CLAMP
MA4023 1~3
RA105 1~33 100Ω×3
DA101
E-SEL
POWER ON
D106
BACK UP
Address Bus
Data Bus
IC120
MB84256
CSRAM
IC210
HC00
HALTECG
HALTCRT
DISPSEL
R125 1K
IC151
MSM6242 RS
STD P
TP151 64.0Hz
TP152 E0
X151 32.768kHz
C151 22P
C152 ECR-GA035MII
D151 1S953
D152
D153 1S953
R153 560Ω
BAT 151
R152 100K
HD63B03Y
IC107
IC106 HC123A
1/5
DWG NO 105526C
MODEL UP-7737
NAME ECG / CPU BD (1/5) MAIN
C 13.33 89 5 8
B 5.11 63 10 25
A 7.33 63 1 21
REV
REASON
DATE
CHK
APPD
TRACE

11.

TEC7100/7200/7300.01

ECG / CPU BD

UP-7737


CNJ100 TO DIP SW
CNJ108 TO POWER
NIHON KOHDEN
TOKYO JAPAN
CNJ157 TO PANEL
CNJ 355 TO PADDLE
TO ECG
CNJ 303
T301
T302
T352
T351
T381
IC201
IC203
IC204
IC202
IC102
IC401
IC402
IC403
IC404
IC120
1
2
3
6
7
8
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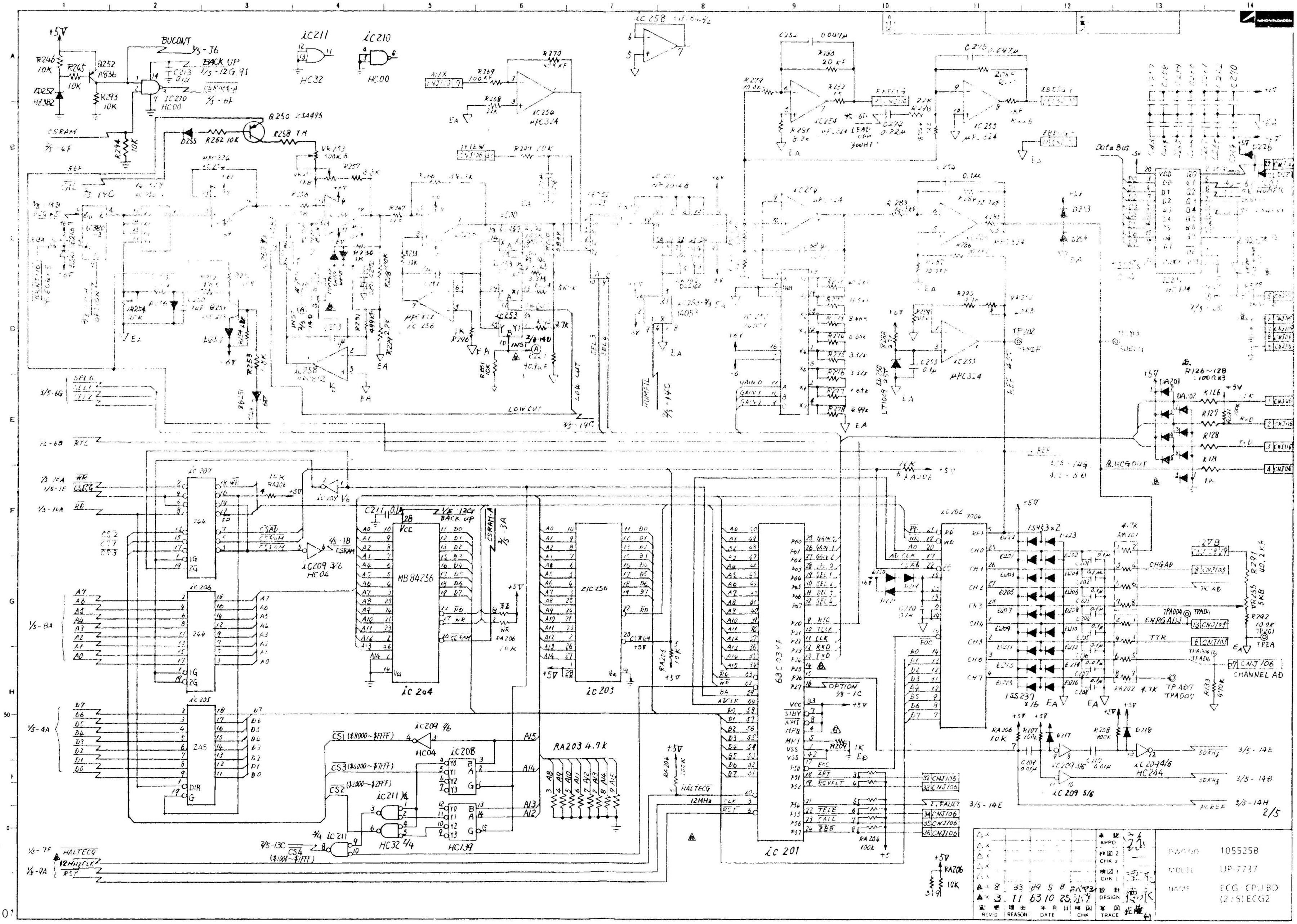
13



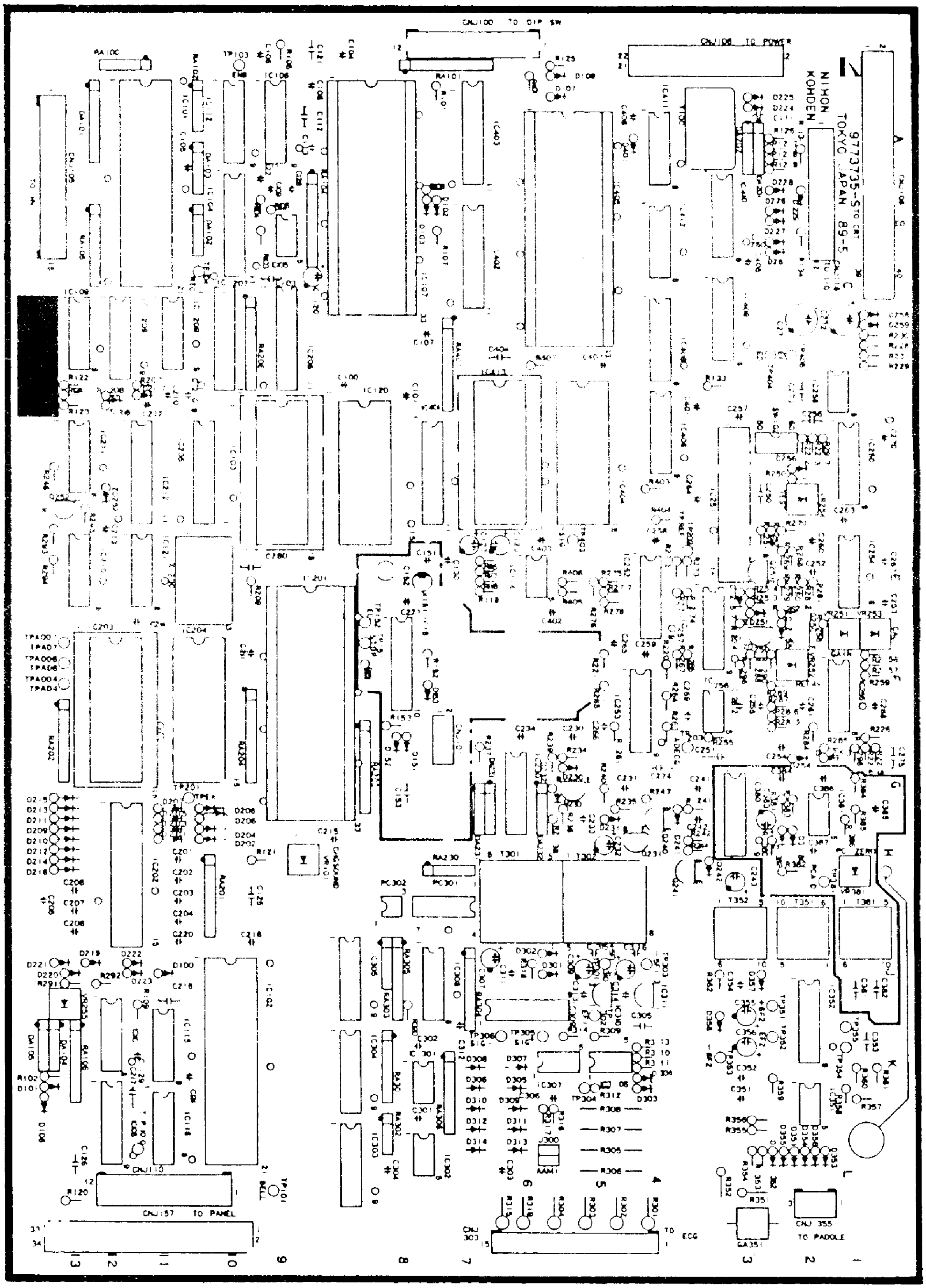
IC211 HC32
IC210 HC00
IC258
IC256 μPC324
IC255 μPC324
IC254 μPC324
IC253 4053
IC207 244
IC206 244
IC205 245
IC209 HC04
IC208 HC139
IC204 MB84256
IC203
IC201 63C03YF
IC202
Q252 A836
Q250 2SA495
BUCONT
BACK UP
CSRAM
Data BUS
CHANNEL AD
RA203 4.7k
1SS237 ×16
HALTECG
12MHz CLK
RST
2/5

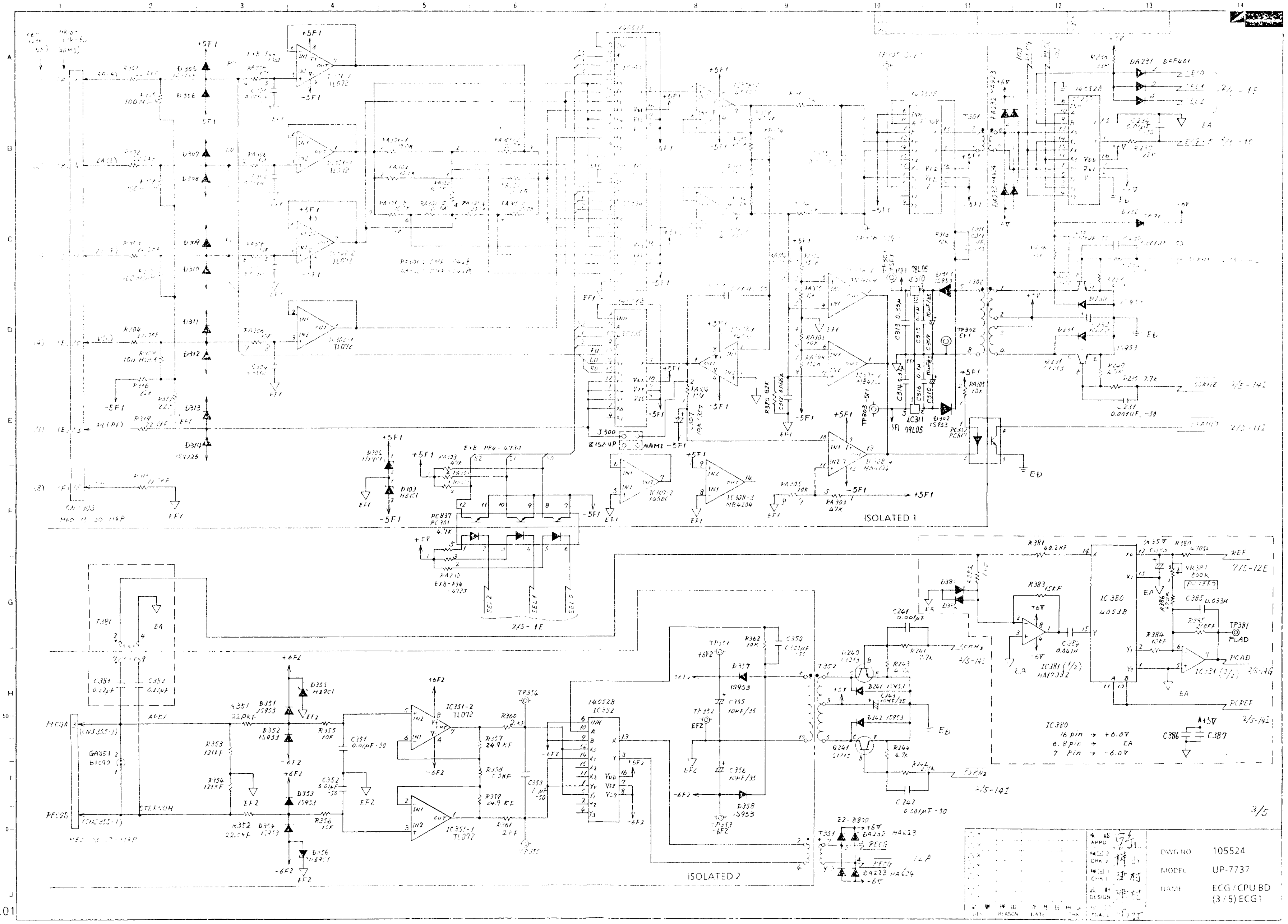
△×				
△×				
△×				
△×				
△×				
▲× 8	33	89 5 8	コバヤシ	
▲× 3	11	63 10 25		
変更 REVIS	理由 REASON	年 月 日 DATE	検図 CHK	

承認 APPD
検図 2 CHK 2
検図 1 CHK 1
設計 DESIGN
写図 TRACE 佐藤

DWG NO 105525B
MODEL UP-7737
NAME ECG CPU BD (2/5) ECG2

ECG / CPU BD
UP-7737


CNJ100 TO DIP SW
CNJ106 TO POWER
NIHON KOHDEN
TOKYO JAPAN 89-5
CNJ157 TO PANEL
CNJ 303 TO ECG
CNJ 355 TO PADDLE
GA351



1
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7
8
9
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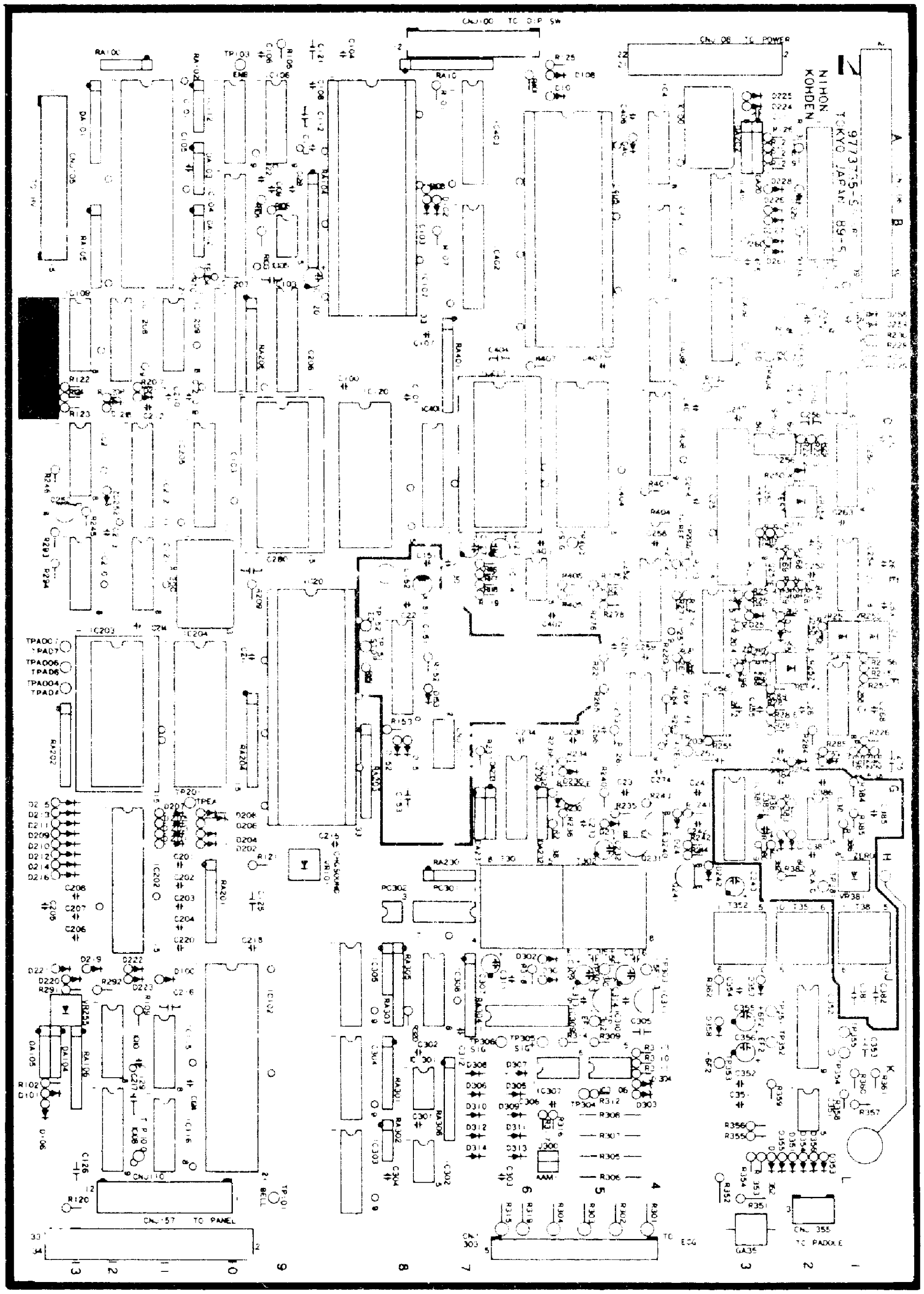
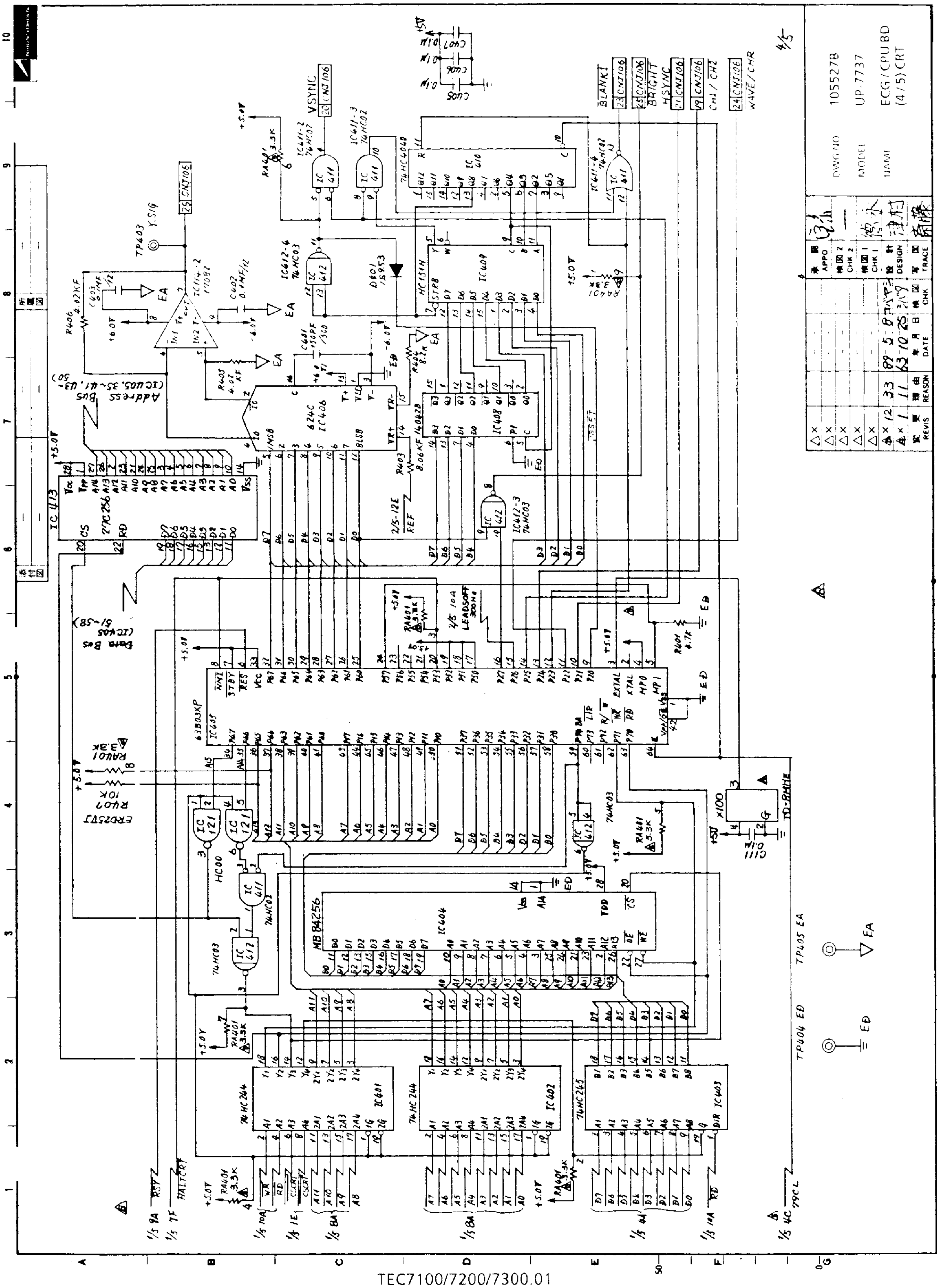
11
12
13
14
A
B
C
D
E
F
G
H
I
J
ISOLATED 1
ISOLATED 2
+5F1
-5F1
EF1
TL072
IC351-2
TL072
IC351-1
TL072
IC380
4053B
IC381 (1/2)
HA17032
IC381 (2/2)
IC352
14052B
IC311
79L05
MB4204
IC308-3
MB4204
J300
T381
T352
T351
R381
40.2KF
R383
15KF
R380
470Ω
VR381
TP381
PCAD
PCREF
REF
2/5-12E
2/5-14I
2/5-14I
2/5-1E
C381
0.22μF
C352
0.22μF
GA351
R351
22.0KF
R352
22.0KF
D351
1S953
D352
1S953
D353
1S953
D354
1S953
D355
HZ8C1
D356
HZ8C1
R357
24.9KF
R359
24.9KF
R358
1.5KF
R360
2KF
R361
2KF
C351
0.01μF-50
C353
1μF-50
TP354
+6F2
-6F2
EF2
EA
EB
TP351
TP352
TP353
D357
1S953
D358
1S953
C355
10μF/35
C356
10μF/35
R362
10K
C354
Q240
Q241
R243
4.7K
R244
4.7K
R241
2.7K
R242
2.7K
C241
0.001μF
C242
0.001μF-50
D241
1S953
D242
1S953
C243
10μF/35
ECKH
ECKH
BZ-B820
DA232
DA233
HA624
PECG
PCA
PECGA
PECGS
MEC 5-11-11P
IC380
16 pin → +6.0V
8,6 pin → EA
7 pin → -6.0V
C386
C387
+5V
3/5

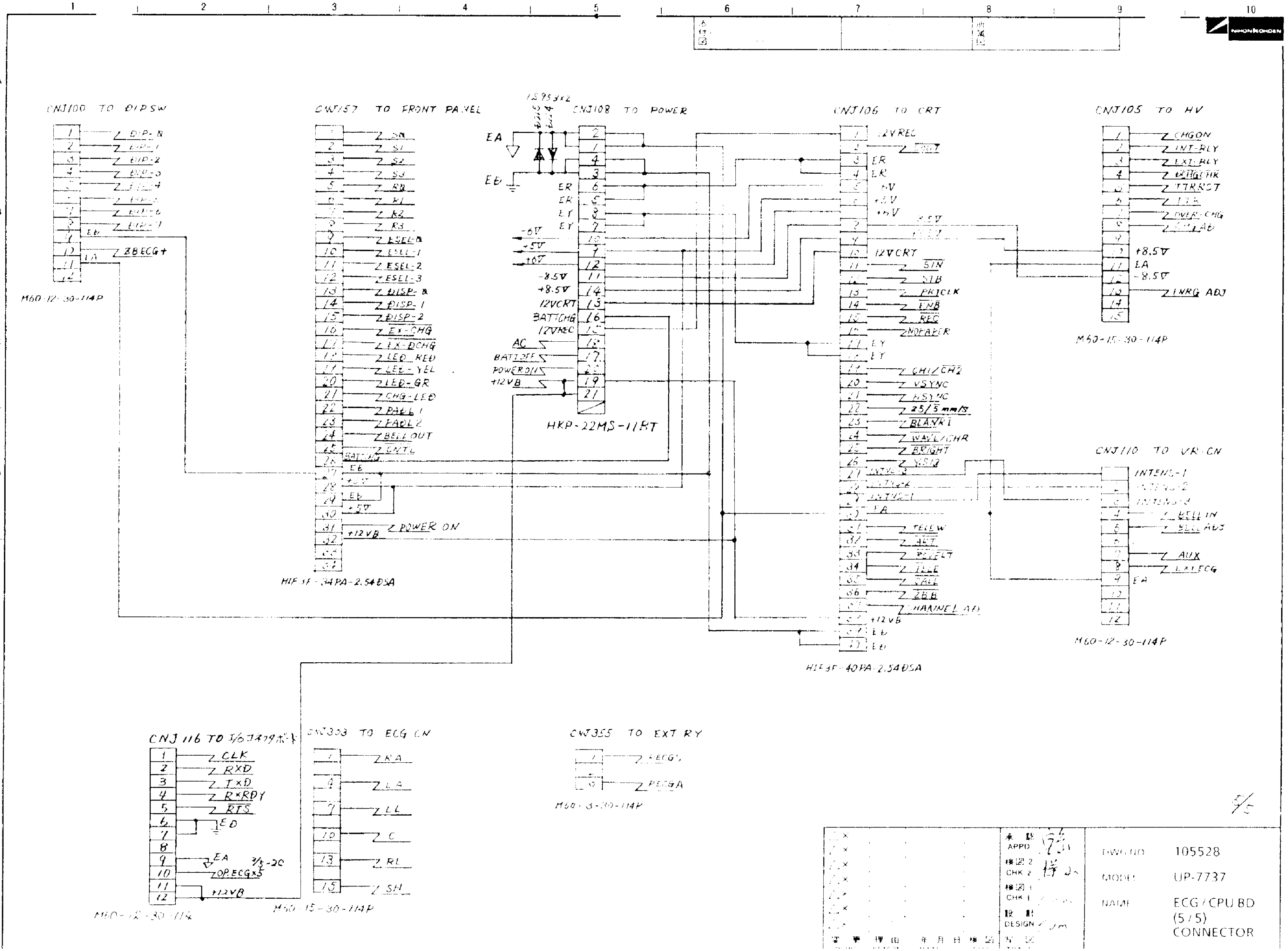
APPD		DWG NO	105524
CHK 2		MODEL	UP-7737
CHK 1		NAME	ECG / CPU BD (3 / 5) ECG1
DESIGN			

REV REASON DATE CHK TRACE

ECG / CPU BD
UP-7737


CN-100 TO DIP SW
CN-108 TO POWER
NIHON KOHDEN
TOKYO JAPAN
IC203
IC204
IC202
TPAD07
TPAD06
TPAD04
CN-157 TO PANEL
BELL
TO ECG
T352
T35
T38
TO PADDLE
A
B
G
H
J
K
L
13
12
11
10
9
8
7
6
5
4
3
2
1

 4/5
DWG NO 105527B
MODEL UP-7737
NAME ECG/CPU BD (4/5) CRT
APPO
CHK 2
CHK 1
DESIGN
TRACE
REVIS
REASON
DATE
CHK
89-5-8
63-10-25
IC413 27C256
IC406 624C
IC408 14042B
IC409 74HC151H
IC410 74HC4040
IC405 63B03XP
IC404 MB84256
IC401 74HC244
IC402 74HC244
IC403 74HC245
IC411 74HC02
IC412 74HC03
IC114-2 17092
IC121 HC00
TD-RHHE x100
D401 1S953
TP403 Y.SIG
TP404 ED
TP405 EA
CN3106
VSYNC
BLANKI
BRIGHT
HSYNC
CH1/CH2
WAVE/CHR
Address Bus (IC405, 35~41, 43~50)
Data Bus (IC405 51~58)
+5.0V
-6.0V
+6.0V
EA
ED
RA401 3.3K
R401 10K
R400 ERD25TJ
R406 4.02KF
R405 4.02KF
R403 8.06KF
R404 8.2K
R401 4.7K
C403
C402 0.1MF/12
C401 150PF/320
C405 C406 C407 0.1μ
C111
2/5 12E REF
2/5 10A LEADSOFF 300Hz
1/5 9A RST
1/5 7F HALTCRT
1/5 10A WR RD
1/5 1E CSCRT
1/5 8A A11 A10 A9 A8
1/5 6A A7 A6 A5 A4 A3 A2 A1 A0
1/5 6A D7 D6 D5 D4 D3 D2 D1 D0
1/5 10A RD
1/5 4C TRCL
RESET
A B C D E F G
1 2 3 4 5 6 7 8 9 10


CNJ100 TO DIPSW
DIP-R
DIP-1
DIP-2
DIP-3
DIP-4
DIP-5
DIP-6
DIP-7
EB
ZBECG+
EA
M60-12-30-114P
CNJ157 TO FRONT PANEL
SR
S1
S2
S3
RR
R1
R2
R3
ESEL-R
ESEL-1
ESEL-2
ESEL-3
DISP-R
DISP-1
DISP-2
EX-CHG
EX-DCHG
LED-RED
LED-YEL
LED-GR
CHG-LED
PAEL 1
PAEL 2
BELL OUT
CNTL
BATCHG
EB
+5V
EB
+5V
POWER ON
+12VB
HIF3F-34PA-2.54DSA
1S953x2
EA
EB
CNJ108 TO POWER
ER
ER
EY
EY
-6V
+5V
+6V
-8.5V
+8.5V
12VCRT
BATTCHG
12VREC
AC
BATTOFF
POWERON
+12VB
HKP-22MS-11RT
CNJ106 TO CRT
12VREC
EOUT
ER
ER
+V
+5V
+6V
8.5V
12VCRT
STN
STB
PRICLK
ENB
REC
NOPAPER
EY
EY
CH1/CH2
VSYNC
HSYNC
25/5mm/s
BLANK1
WAVE/CHR
BRIGHT
YSIZ
INTENS-1
INTENS-2
+12VB
EA
TELEW
ABT
REFLT
ILLE
SALL
ZBB
CHANNEL AD
EB
EB
HIF3F-40PA-2.54DSA
CNJ105 TO HV
CHGON
INT-RLY
EXT-RLY
BATCHK
TTRRST
ILL
OVER-CHG
CHLAD
+8.5V
EA
-8.5V
ENRG ADJ
M60-15-30-114P
CNJ110 TO VR-CN
INTENS-1
INTENS-2
INTENS-3
BELL IN
BELL ADJ
AUX
EXT ECG
EA
M60-12-30-114P
CNJ116 TO I/Oコネクタボード
CLK
RXD
TXD
RXRDY
RTS
ED
EA
2/5-2C
OP.ECGx5
+12VB
M60-12-30-114
CNJ333 TO ECG CN
RA
LA
LL
C
RL
SH
M60-15-30-114P
CNJ355 TO EXT RY
RECGS
RECGA
M60-3-30-114P
5/5
NIHON KOHDEN
APPD
CHK 2
CHK 1
DESIGN
DWG NO
MODEL
NAME
A
B
C
D
E
F
G
1
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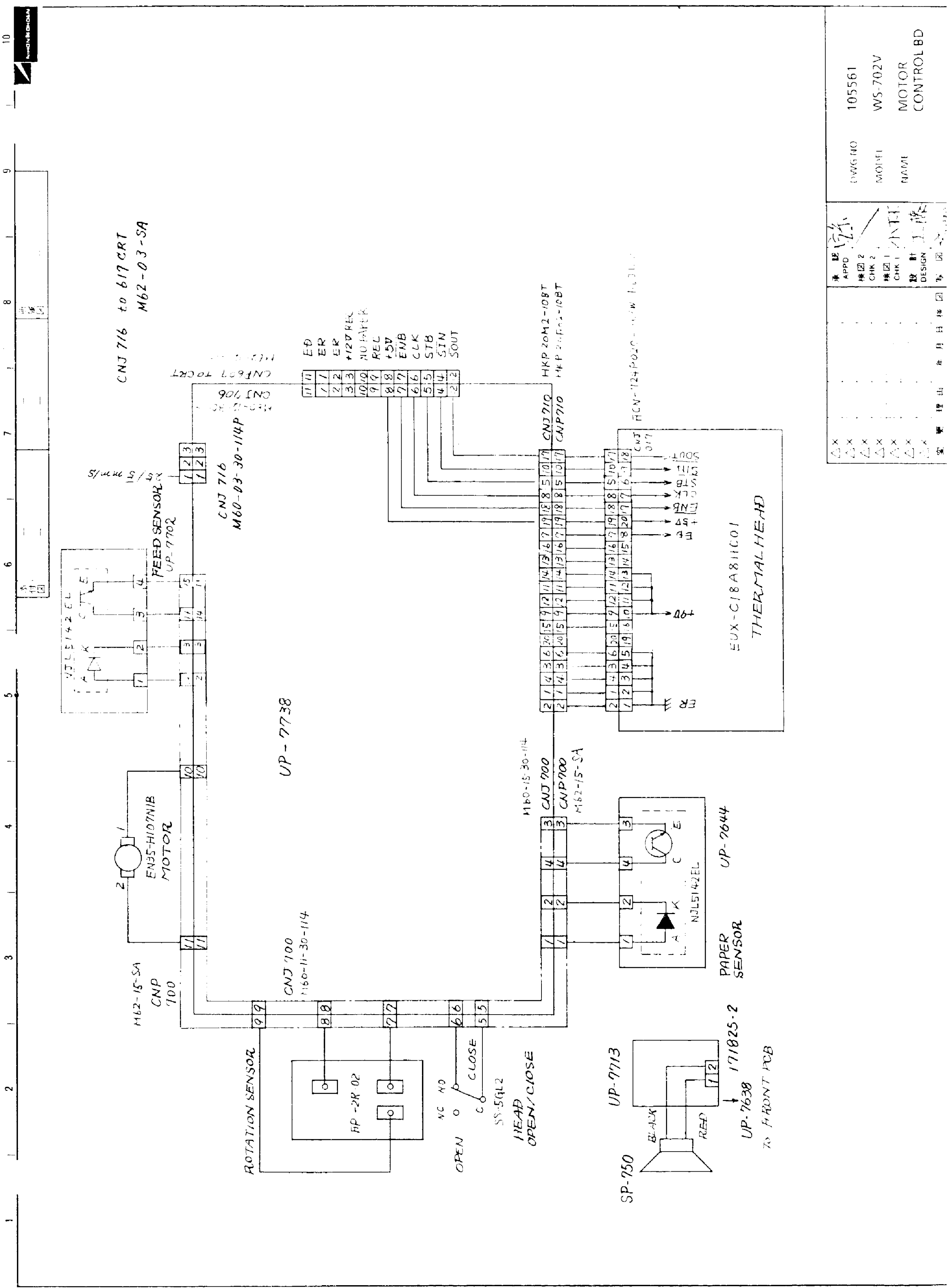
10

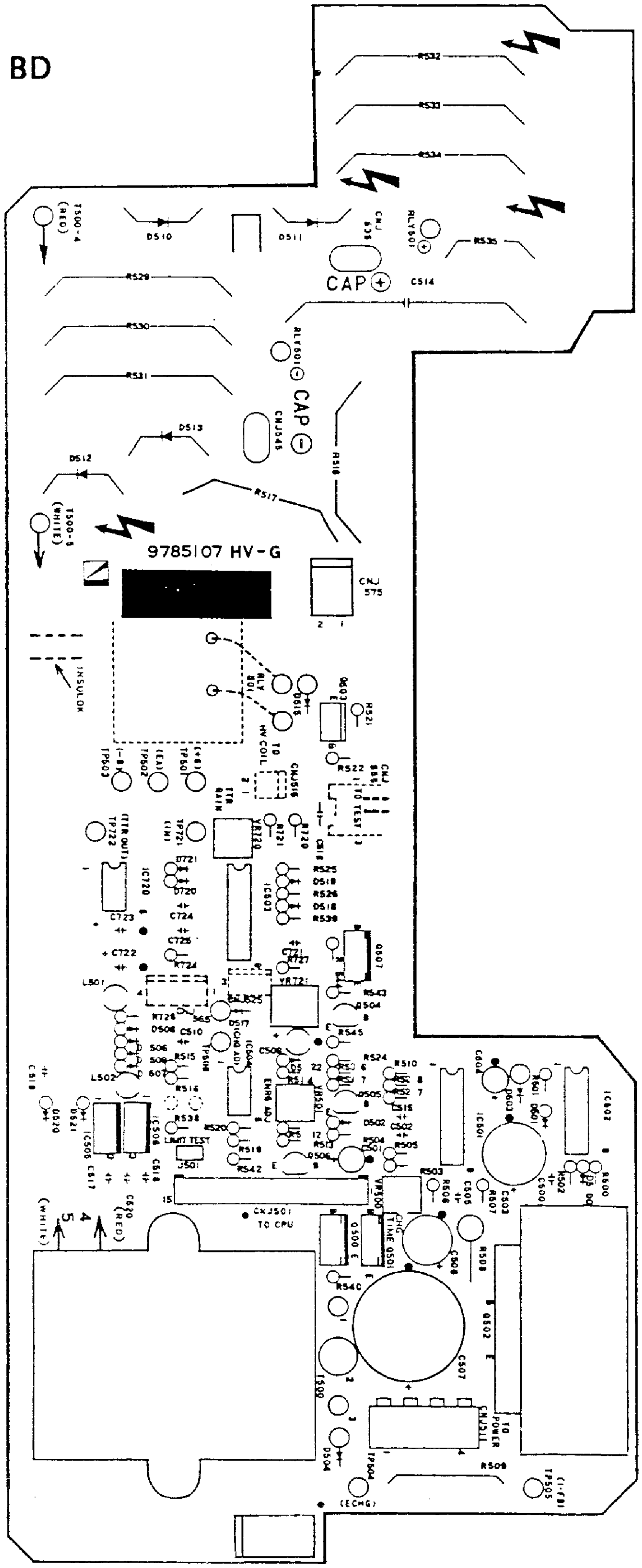
DWG NO 105528

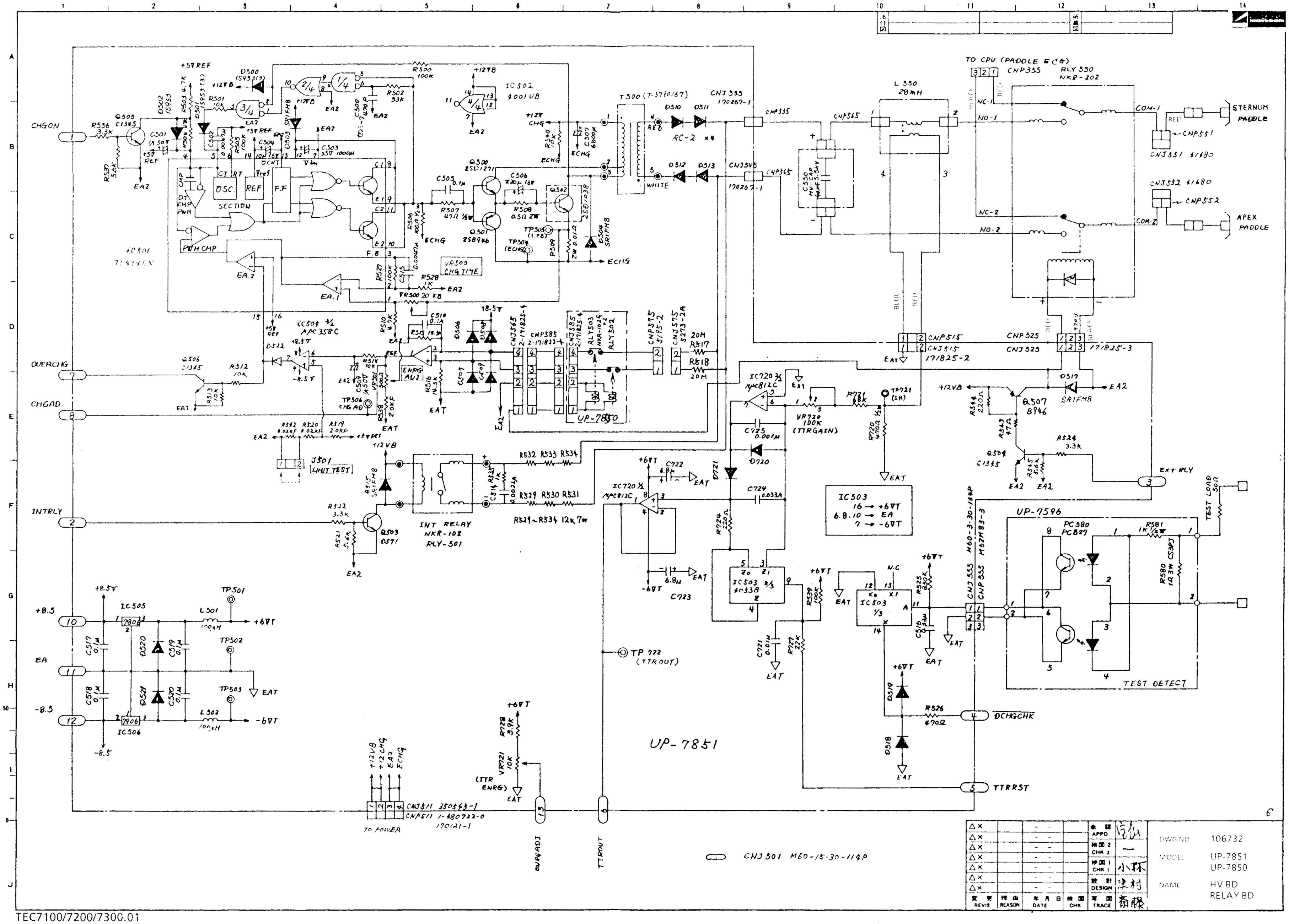
MODEL UP-7737

NAME ECG/CPU BD (5/5) CONNECTOR


DWG NO 105561
MODEL WS-702V
NAME MOTOR CONTROL BD
APPD
CHK 2
CHK 1
DESIGN
CNJ 716 to 617 CRT
M62-03-SA
CNJ 607 TO CRT
CNJ 706
CNJ 716
M60-03-30-114P
FEED SENSOR
UP-7702
NJL5142EL
A K C E
UP-7738
EN35-HI07NIB
MOTOR
M62-15-SA
CNP 700
CNJ 700
M60-11-30-114
ROTATION SENSOR
RP-2R 02
NC NO
OPEN CLOSE
C
SS-5GL2
HEAD OPEN/CLOSE
ED ER ER +12V REL NO PAPER REL +5V ENB CLK STB SIN SOUT
HKP 20M2-10BT
CNJ 710
CNP 710
M60-15-30-114
CNJ 900
CNP 700
M62-15-SA
EUX-C18A811C01
THERMAL HEAD
SOUT STB CLK ENB +5V ED
+9V
ER
UP-7644
PAPER SENSOR
NJL5142EL
UP-7713
171825-2
UP-7638
TO FRONT PCB
BLACK
RED
SP-750
1 2 3 4 5 6 7 8 9 10
A B C D E F G

HIGH VOLTAGE BD
UP-7851


R532
R533
R534
R535
D510
D511
CNJ 636
RLY501
CAP
C514
T500-4 (RED)
R529
R530
R531
RLY501
CAP
CNJ545
D513
D512
R516
R517
T500-5 (WHITE)
9785107 HV-G
CNJ 575
INSULOK
RLY 801
D515
Q603
R521
TO HV COIL
TP501
TP502
TP503
CNJ516
R522
CNJ 885 TO TEST
TTR GAIN
VR720
R721
R720
C818
TP722
TP721
D721
D720
IC720
C723
C724
C725
C722
R724
IC803
R525
D518
R526
D518
R530
Q607
R727
VR721
R543
Q504
L501
R728
D506
C510
D517
R545
R515
R516
R538
R520
R518
R542
J501
LIMIT TEST
L502
D521
D520
IC506
IC508
C817
C818
C819
R524
R510
C515
Q505
Q502
R504
Q501
Q506
R513
R505
R503
VR500
ENRG ADJ
IC601
D601
R601
D603
IC602
C603
R508
C506
R507
C500
R502
R600
C604
CNJ501 TO CPU
C820 (RED)
(WHITE)
5
4
Q500
CHG TIME
Q501
C508
R508
R540
C507
Q502
T500
D504
CNJ511 TO POWER
R509
TP504 (ECHG)
TP505 (I-FB)


CHGON
OVERCHG
CHGAD
INTRLY
+8.5
EA
-8.5
IC501 TL494CN
IC502 4001UB
IC503
IC505 7808
IC506 7908
IC720 1/2 NJM4558 μPC812C
T500 (T-3790/67)
RLY 550 NKR-202
INT RELAY NKR-102 RLY-501
L550 28mH
TO CPU (PADDLE ECG)
CNJ355
STERNUM PADDLE
APEX PADDLE
CNJ551 1/680
CNJ552 1/680
CNP551
CNP552
COM-1
COM-2
NC-1
NO-1
NC-2
NO-2
CNJ335 170267-1
CNJ345 170267-1
CNP515
CNJ515 171825-2
CNP525
CNJ525 171825-3
CNJ365
CNP385
CNJ385
RLY503
UP-7850
UP-7596
TEST DETECT
TEST LOAD 50Ω
PC580 PC827
R581 1K 1/2W
R580 12.3W
EXT RLY
DCHGCHK
TTRRST
TP721 (1M)
TP722 (TTROUT)
VR720 100K (TTRGAIN)
VR721 10K (TTR ENRG)
VR500 CHG TIME
ENRG ADJ
J501 LIMIT TEST
TP501
TP502
TP503
+6VT
-6VT
EAT
EA2
ECHG
+12VB
+12 CHG
IC503 16 → +6VT 6.8.10 → EA 7 → -6VT
R529~R534 12k 7W
UP-7851
CNJ511 350563-1
CNP511 1-480722-0 170121-1
TO POWER
ENRGADJ
TTROUT
6

CNJ501 M60-15-30-114P

DWG NO	106732
MODEL	UP-7851 UP-7850
NAME	HV BD RELAY BD

11.5

MANUAL CHANGE INFORMATION

[illegible] latest [illegible] in the [illegible] of the [illegible] printing and shipping [illegible]

[illegible]

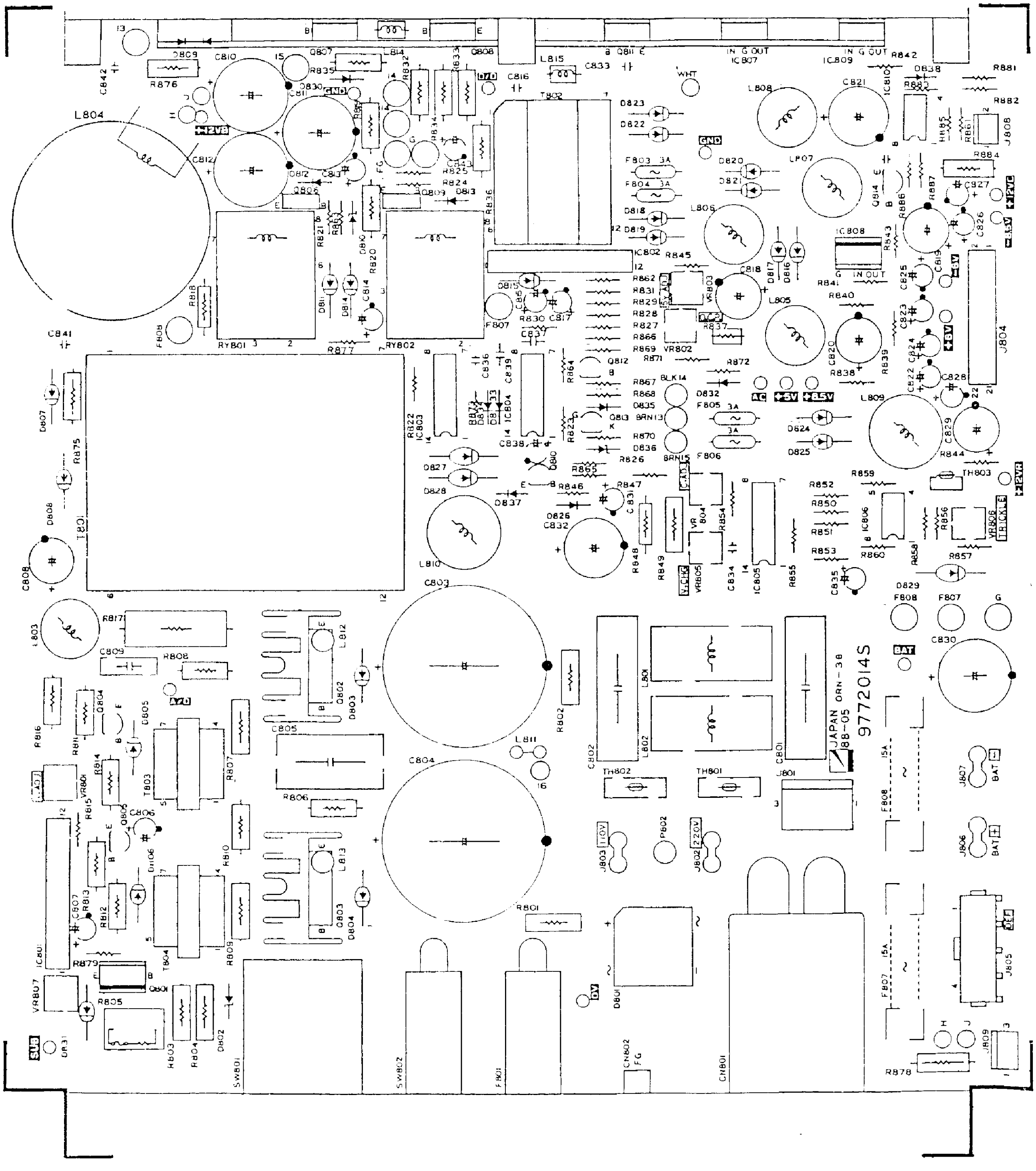
REVISION TABLE (TEC-7100 series)

Model	Master Revision	Serial No.
TEC-7100 A . B . C . E . F . G . H . J [✓ K] R	A5 . A6 . A7 . [✓ A8] . A9 B0 . B1 . B2 . B3 . B4	From 21167
ZR-701VK/702V	[✓ A0] . A6 . A7 . A8 . A9 B0 . B1 . B2 . B3 . B4	From 20001

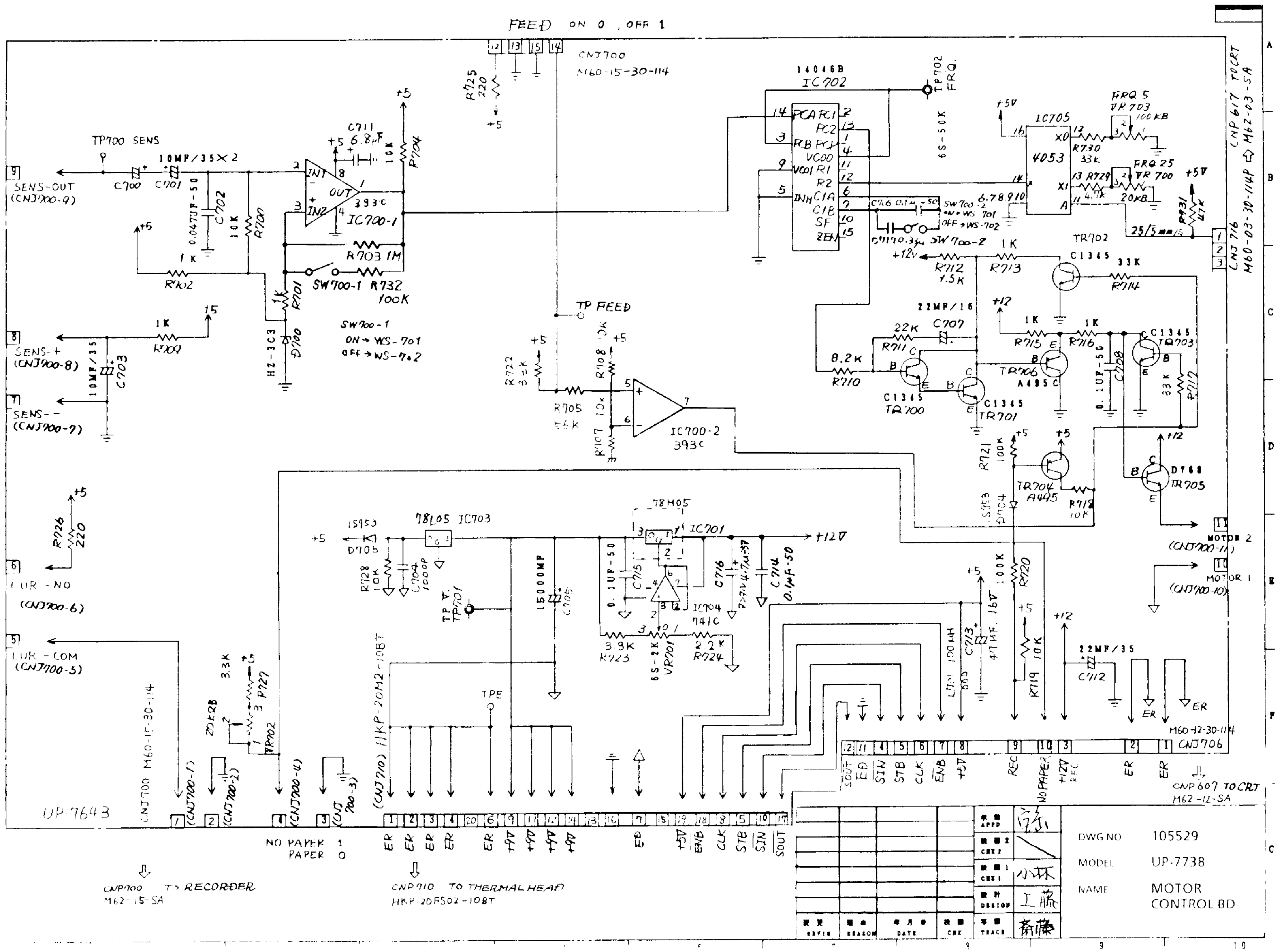
Unit	Description	Component Revision
TEC-7000X	Chassis Parts-1	[✓ A0] . A1 . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
YZ-001G#	Chassis Parts-2	[✓ A0] . A1 . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
TEC-710#Z	Accessories	[✓ A0] . A1 . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
ND-701V#	External Paddle	A0 . [✓ A1] . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
SC-701V#	Power Unit	A0 . A1 . [✓ A2] . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
WS-701V#	Recorder Unit	A0 . [✓ A1] . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
UP-7636/7851	High Voltage BD	A0 . A1 . [✓ A2] . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
UP-7740	CRT Driver	A0 . A1 . [✓ A2] . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
UP-7638	Front Panel BD	A0 . [✓ A1] . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
US-7635#	ECG/CPU BD	A0 . A1 . A2 . A3 . A4 . [✓ A5] . A6 . A7 . A8 . A9 . B0 . B1 . B2
ZR-701VK UP-6762A	RF BD	[✓ A0] . A1 . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2
ZR-702V UP-67692	RF BD	A0 . A1 . A2 . A3 . A4 . A5 . A6 . A7 . A8 . A9 . B0 . B1 . B2

Model	YZ-001G#	TEC-710#Z	ND-701V#	SC-701V#	WS-701V#	US-7635#
TEC-7100A	YZ-001G8	TEC-7101Z	ND-701V	SC-701VA	WS-701VA	US-76353
TEC-7100B	YZ-001G9	TEC-7102Z	ND-701V	SC-701VB	WS-701VA	US-76355
TEC-7100C	YZ-001G0	TEC-7102Z	ND-701V	SC-701VK	WS-701VC	US-76355
TEC-7100F	YZ-001G1	TEC-7105Z	ND-701VF	SC-701VF	WS-701VF	US-7635A
TEC-7100G	YZ-001G2	TEC-7103Z	ND-701VG	SC-701VG	WS-701VG	US-76357
TEC-7100R	YZ-001G3	TEC-7106Z	ND-701VR	SC-701VR	WS-701VR	US-7635B
TEC-7100J	YZ-001G4	TEC-7104Z	ND-701V	SC-701VJ	WS-701VA	US-76355
TEC-7100K	YZ-001G5	TEC-7102Z	ND-701V	SC-701VK	WS-701VA	US-76355
TEC-7100E	YZ-001G6	TEC-7107Z	ND-701VE	SC-701VE	WS-701VE	US-76359
TEC-7100H	YZ-001G8	TEC-7108Z	ND-701VH	SC-701VH	WS-701VH	US-7635K

SW REGULATOR
UP-7720

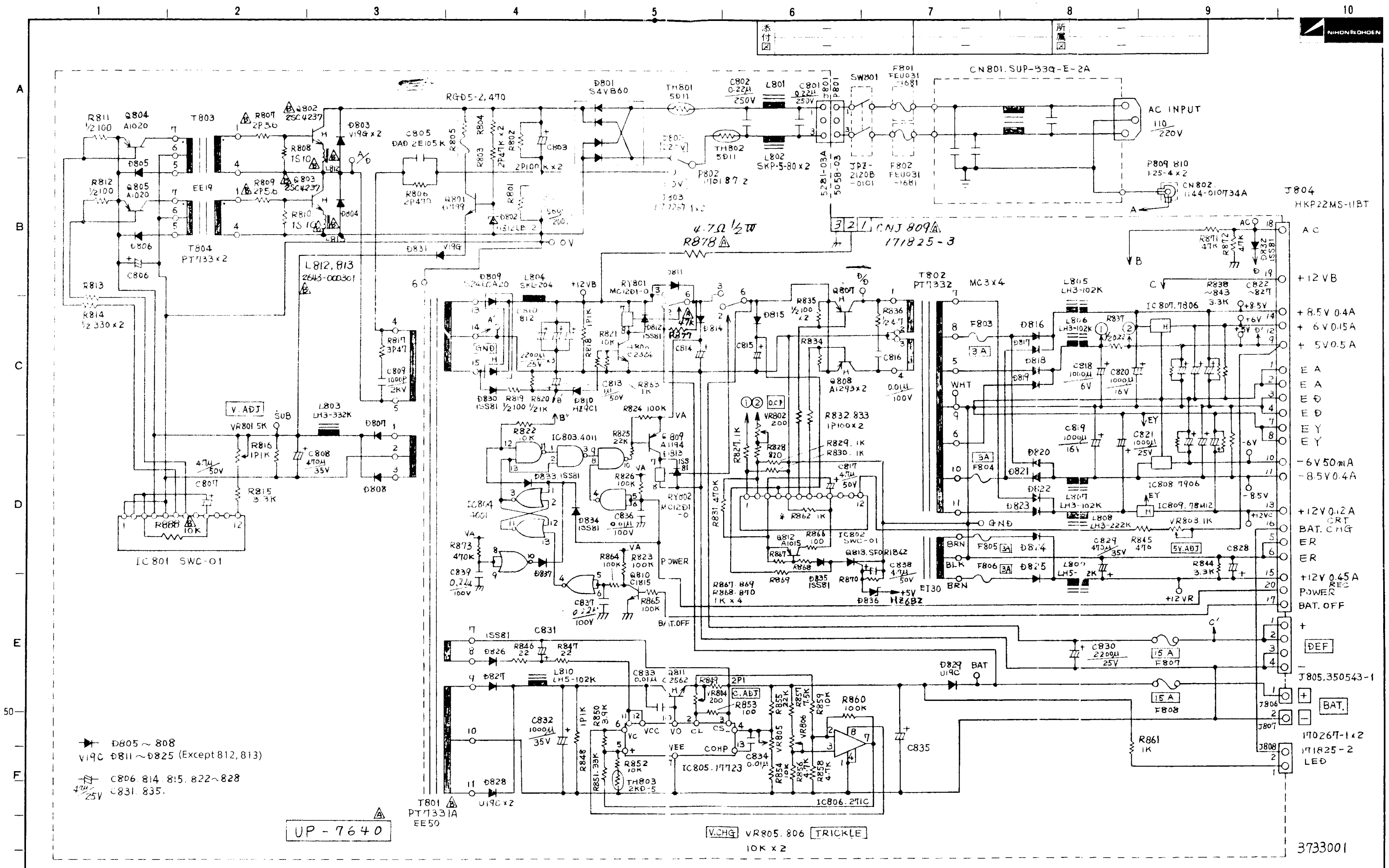


L804
C810
C811
C812
C842
R876
D809
Q807
L814
Q808
L815
C833
C816
T802
Q811
IC807
IC809
IN G OUT
R842
D838
R881
R882
J808
R884
IC810
R883
L808
C821
LP07
Q814
R887
R886
C827
C826
C819
C825
C823
C824
C822
C828
C829
R843
R841
R840
R838
R839
IC808
L805
L806
C818
D817
D816
D818
D819
D820
D821
D822
D823
F803 3A
F804 3A
GND
WHT
IC802
R845
R862
R831
R829
R828
R827
R866
R869
R871
R872
R837
VR803
VR802
5V ADJ
C817
R830
D815
C837
F807
RY801
RY802
R877
R818
F808
C841
D811
D814
C814
R820
R821
Q806
D812
D813
R824
R825
R836
R832
R833
R834
R835
D830
+12VB
GND
IC803
IC804
R822
R823
C836
C839
C838
Q812
Q813
R864
R867
R868
D835
D832
BLK14
BRN13
BRN15
R870
D836
R826
F805
F806
D824
D825
AC
+5V
+8.5V
L809
R844
TH803
+12VR
J804
+8V
+12VC
D827
D828
D837
D826
C832
C831
R846
R847
R865
R848
R849
VR804
VR805
R854
C834
IC805
R855
R852
R850
R851
R853
R859
R860
IC806
R858
R856
VR806
TRICKLE
R857
D829
C835
F808
F807
G
C830
BAT
T801
D807
R875
D808
C808
L810
C803
C804
L803
R817
C809
R808
A/D
C805
R806
R807
R802
L801
L802
C801
C802
TH801
TH802
J801
JAPAN
88-05
ORN-38
9772014S
L811
16
R801
Q802
Q803
D803
D804
L812
L813
R816
R811
Q804
Q805
D805
R814
R815
VR801
T803
T804
R810
R809
C806
D806
R812
R813
C807
IC801
R879
Q801
VR807
R805
R803
R804
D802
SW801
SW802
F801
CN801
CN802
FG
D801
DV
J803
110V
P602
J802
220V
J805
J806
J807
BAT +
BAT −
F807 15A
F808 15A
J809
R878
H
J
SUB
DR31


FEED ON 0 , OFF 1
CNJ700 M60-15-30-114
R725 220
TP700 SENS
10MF/35×2
C700
C701
0.047UF-50
C702
10K R700
1K R702
SENS-OUT (CNJ700-9)
SENS-+ (CNJ700-8)
SENS-- (CNJ700-7)
10MF/35 C703
1K R709
HZ-3C3 D700
1K R701
IC700-1 393C
C711 6.8μF
10K P704
R703 1M
SW700-1 R732 100K
SW700-1 ON→WS-701 OFF→WS-702
TP FEED
R722 33K
R705 56K
R707 10K
R708 10K
IC700-2 393C
14046B IC702
PCA FC1 FC2 PCB FC2 VC00 VC01 R1 R2 INH C1A C1B SF ZEN
TP702 FRQ.
6S-50K
C716 0.1M-50
SW700-2 ON→WS-701 OFF→WS-702
C717 0.33μ SW700-2
IC705 4053
X0 X1 A
FRQ 5 VR703 100KB
R730 33K
R729 4.7K
FRQ 25 VR700 20KB
R731 47K
25/5 mm/s
R712 1.5K
R713 1K
TR702 C1345
R714 33K
22MF/16 C707
22K R711
8.2K R710
C1345 TR700
C1345 TR701
R715 1K
R716 1K
TR706 A495
0.1UF-50 C708
C1345 TR703
33K R717
R721 100K
TR704 A495
R718 10K
1S953 D704
DT68 TR705
MOTOR 2 (CNJ700-11)
MOTOR 1 (CNJ700-10)
CNP617 TO CRT M62-03-SA
CNJ716 M60-03-30-114P
1S953 D705
78L05 IC703
R728 10K
C704 1000P
TP V. TP701
15000MF C705
78M05 IC701
0.1UF-50 C715
C716 タンタル 4.7μ-35
C714 0.1μF-50
IC704 741C
3.9K R723
6S-2K VR701
2.2K R724
L701 100μH
C713 47MF 16V
R720 100K
R719 10K
22MF/35 C712
M60-12-30-114 CNJ706
SOUT ED SIN STB CLK ENB +5V REC NO PAPER +12V REC ER ER
CNP607 TO CRT M62-12-SA
R726 220
LUR-NO (CNJ700-6)
LUR-COM (CNJ700-5)
20KB VR702
3.3K R727
(CNJ700-1) (CNJ700-2) (CNJ700-4) (CNJ700-3)
(CNJ710) HKP-20M2-10BT
TPE
UP-7643
NO PAPER 1 PAPER 0
ER ER ER ER ER +9V +9V +9V +9V ED +5V ENB CLK STB SIN SOUT
CNP700 TO RECORDER M62-15-SA
CNP710 TO THERMAL HEAD HKP-20FS02-10BT
+5 +12 +12V

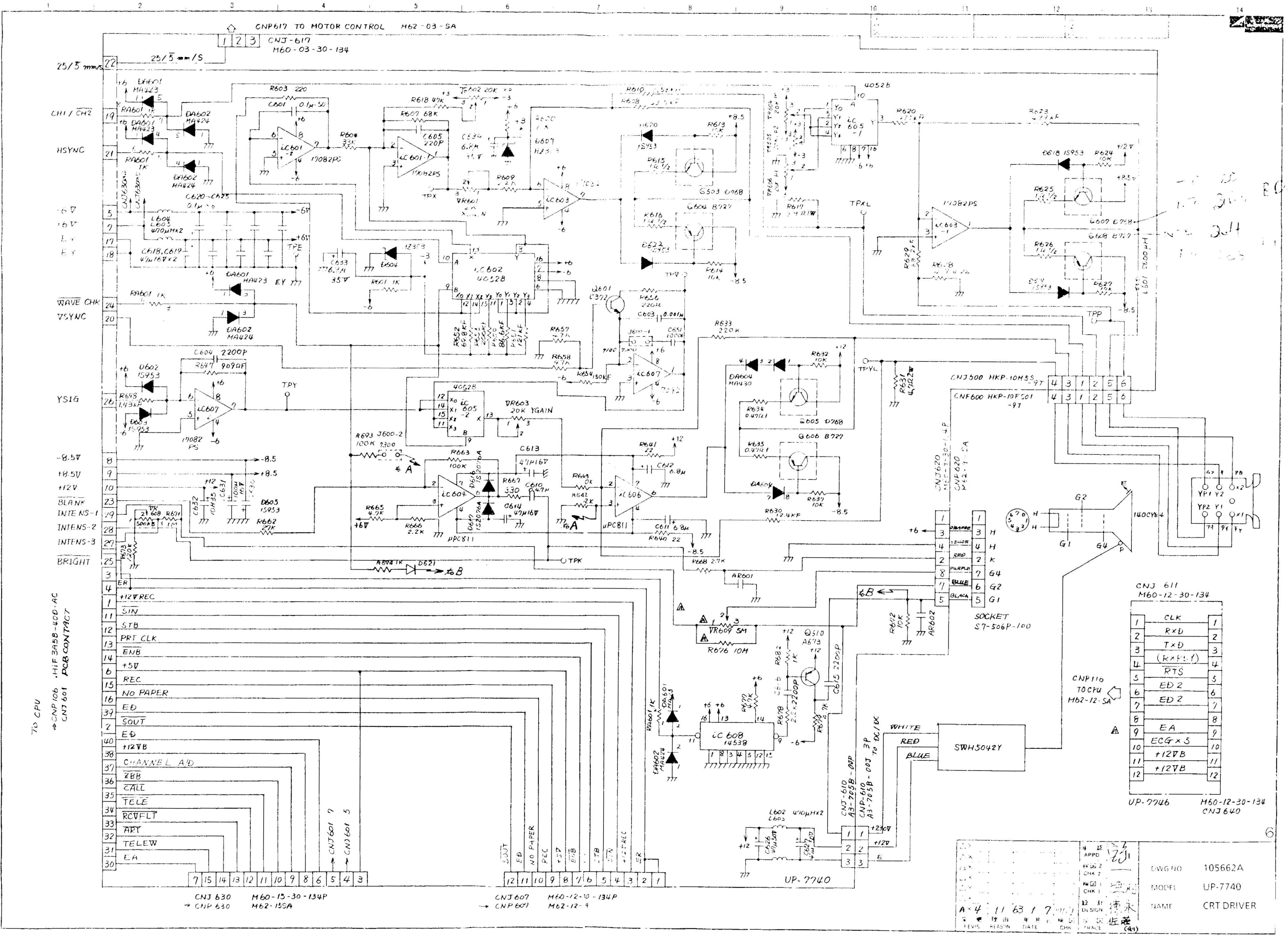
DWG NO	105529
MODEL	UP-7738
NAME	MOTOR CONTROL BD

承認 APPD		
検査2 CHK2		
検査1 CHK1	小林	
設計 DESIGN	工藤	
写図 TRACE	斎藤	


NIHON KOHDEN
AC INPUT 110/220V
CN801. SUP-B3Q-E-2A
SW801
F801 FEU031-1681
F802 FEU031-1681
L801
L802 SKP-5-80×2
C801 0.22μ 250V×2
C802 0.22μ 250V
TH801 5D11
TH802 5D11
D801 S4VB60
RGD5-2, 470
T803
T804 PT7133×2
EE19
Q802 2SC4237
Q803 2SC4237
Q804 A1020
Q805 A1020
D803 V19G×2
C805 DA02E105K
L812, 813 2643-000301
IC801 SWC-01
V.ADJ
VR801 5K
L803 LH3-332K
T801 PT7331A EE50
T802 PT7332
MC3×4
RY801 MC1201-0
RY802 MC1201-0
IC803 4011
IC804 4001
IC805 17723
IC806 2710
IC807 7806
IC808 7906
IC809 78M12
IC802 SWC-01
R878 4.7Ω 1/2W
CNJ 809 171825-3
J804 HKP22MS-11BT
CN802 1144-01074A
P809 810 125-4×2
AC
+12VB
+8.5V 0.4A
+6V 0.15A
+5V 0.5A
EA
EA
ED
ED
EY
EY
-6V 50mA
-8.5V 0.4A
+12V 0.12A CRT
BAT. CHG
ER
ER
+12V 0.45A REC
POWER
BAT. OFF
DEF
J805. 350543-1
BAT.
J806
J807
J808
170267-1×2
171825-2
LED
F807 15A
F808 15A
C830 2200μ 25V
D829 U19C
VR803 1K
5V.ADJ
C.ADJ
V.CHG
VR805. 806 TRICKLE 10K×2
TH803 2KD-5
D805 ~ 808
V19G D811 ~ D825 (Except 812, 813)
C806 814 815. 822~828 C831. 835.
47μ 25V
UP-7640
3733001

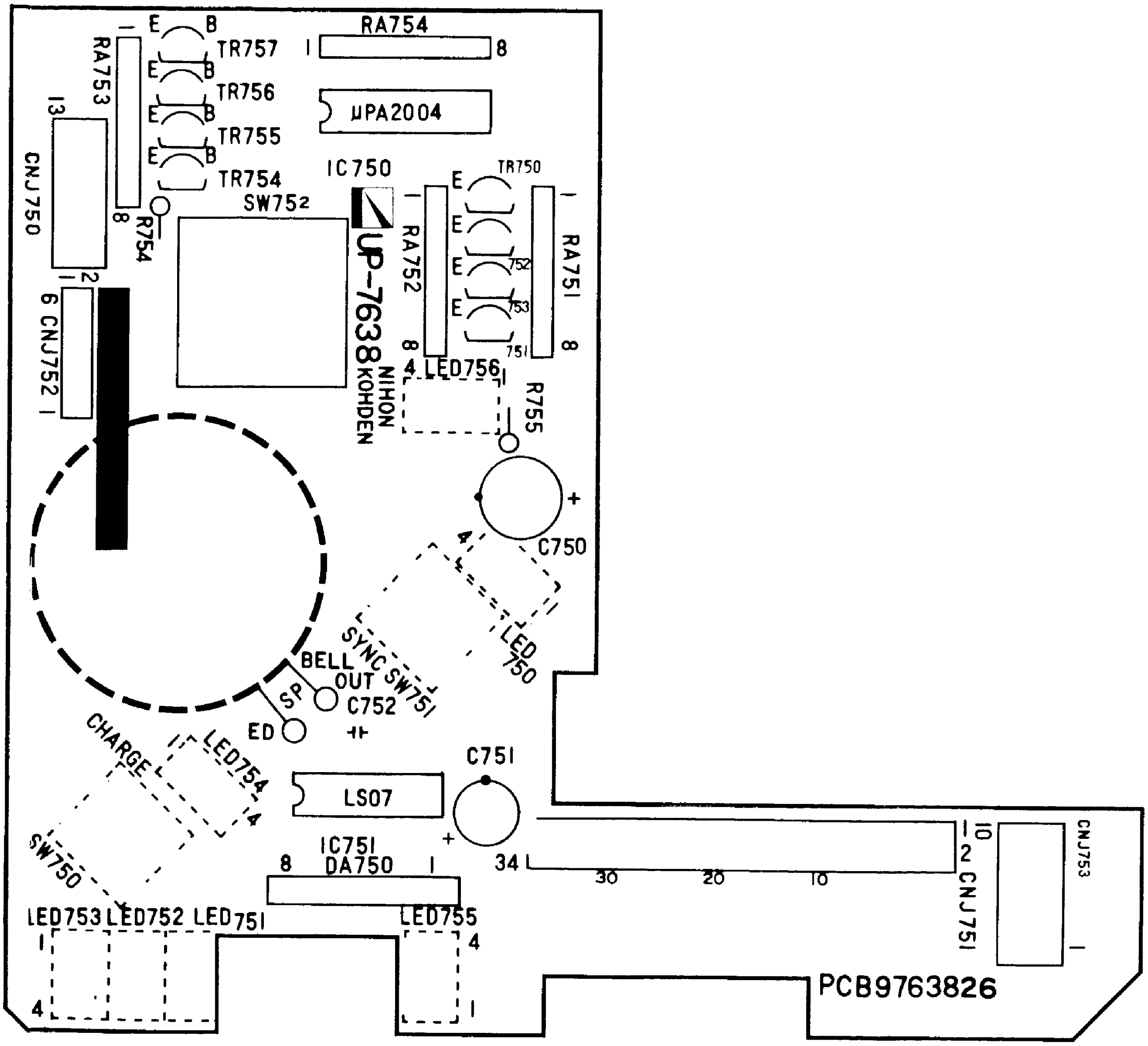
▲×			
▲×			
▲×			
▲×			
▲×11	33	1-2-16	大保田
▲×4	11	61-12-16	工藤
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK

承認 APPD		DWG NO	104796B
検図2 CHK 2	下井	MODEL	UP-7640
検図1 CHK 1	工藤	NAME	SW REGULATOR
設計 DESIGN	浜中		
写図 TRACE	西川		


CNP617 TO MOTOR CONTROL M62-03-SA
CNJ-617 M60-03-30-134
25/5 mm/S
CH1 / CH2
HSYNC
+6V
-6V
EY
WAVE CHK
VSYNC
YSIG
-8.5V
+8.5V
+12V
BLANK
INTENS-1
INTENS-2
INTENS-3
BRIGHT
+12V REC
SIN
STB
PRT CLK
ENB
+5V
REC
No PAPER
ED
SOUT
+12VB
CHANNEL A/D
ZBB
CALL
TELE
RCVFLT
APT
TELEW
EA
TO CPU
CNP106 HIF3A5B-40D-AC
CNJ601 PCB CONTACT
IC601 17082PS
IC602 4052B
IC603
IC605 4052B
IC604 μPC811
IC606 μPC811
IC607 17082PS
IC608 14538
VR601
VR603 20K YGAIN
VR609 5M
TPX
TPE
TPY
TPK
TPXL
TPYL
TPP
Q601 C392
Q603 D768
Q604 B727
Q605 D768
Q606 B727
Q607 D768
Q608 B727
Q610 A673
CNJ500 HKP-10H5S-9T
CNP600 HKP-10FS01-9T
CNJ620 H60-03-30-14P
CNP620 M62-13-SA
SOCKET S7-506P-100
140CYB4
YP1 Y2 YP2 Y1 X2 X1
CNJ 611 M60-12-30-134
CLK
RxD
TxD
(RxEL)
RTS
ED 2
ED 2
EA
ECG x 5
+12VB
+12VB
CNP110 TO CPU M62-12-SA
SWH5042Y
WHITE
RED
BLUE
CNJ-610 A3-725B-00P
CNP-610 A3-725B-00J 3P TO DC/DC
L602 L603 470μH x 2
UP-7740
UP-7746
M60-12-30-134 CNJ640
CNJ 630 M60-15-30-134P
CNP 630 M62-15SA
CNJ607 M60-12-10-134P
CNP607 M62-12-9
6

A × 4	11	63 1 7		承認 APPD		DWG NO	105662A
				検図 2 CHK 2	一	MODEL	UP-7740
				検図 1 CHK 1		NAME	CRT DRIVER
変更 REVIS	理由 REASON	年月日 DATE	検認 CHK	設計 DESIGN	徳永		
				写図 TRACE	佐藤		

FRONT PANEL BD
UP-7638


RA754
μPA2004
TR757
TR756
TR755
TR754
RA753
CNJ750
R754
IC750
SW752
UP-7638
NIHON KOHDEN
TR750
RA752
RA751
752
753
751
LED756
R755
C750
LED 750
SYNC SW751
BELL OUT
C752
SP
ED
CHARGE
LED754
SW750
LS07
C751
IC751
DA750
CNJ752
LED753
LED752
LED751
LED755
CNJ751
CNJ753
34
30
20
10
PCB9763826